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JOINT DOD/DOE
NUCLEAR WEAPONS ACCIDENT EXERCISE
(NUWAX-79)

AFTER ACTION REPORT

VOLUME I – EXECUTIVE SUMMARY

FIELD COMMAND, DEFENSE NUCLEAR AGENCY
KIRTLAND AFB, NEW MEXICO 87115

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SECTION A

NUWAX-79 OVERVIEW

1. <u>INTRODUCTION</u>: During the period 18-24 April 1979, a Nuclear Weapons Accident Exercise, NUWAX-79, was conducted at the Department of Energy's (DOE) Nevada Test Site (NTS). This exercise was a joint DOD/DOE exercise involving accident response forces from all four Services and the DOE. This unique first-of-a kind exercise by the United States culminated over 2-1/2 years of planning and preparation. The purpose of this report is to document all aspects of the exercise so that the lessons learned from the exercise are considered by managers at every level who may have responsibilities during an actual nuclear weapons accident. It is essential that our nation have trained, competent, and ready accident response forces. The experience and knowledge gained in NUWAX-79 will make an important contribution in the improvement of the capabilities of these forces.

2. <u>BACKGROUND</u>:

a. Observations and reports by U.S. observers at nuclear weapons accident exercises conducted by United Kingdom over the past several years kindled interest in the conduct of similar exercises in the United States. U.S. observers attended both the Royal Air Force SENATOR series and the Royal Navy SURVEYOR series exercises. However, it was not until the U.S. observer teams returned from observing the UK's SENATOR V exercise which was conducted in June 1976 that aggressive action was taken to conduct a U.S. nuclear weapons accident exercise. The Director, Defense Nuclear Agency (DNA) recommended by memorandum (12 Jul 76) to the Assistant to the Secretary of Defense (Atomic Energy) (ATSD(AE)) that a nuclear weapons accident exercise be conducted at

the Energy Research and Development Administration* and Department of Defense (ERDA/DOD) operating level. Such an exercise would provide excellent training as well as promote interest and provide knowledge and experience for the development of a larger scale national exercise. In an ATSD(AE) memorandum (30 Jul 76), signed by Brigadier General Maxson, ATSD(AE) concurred with Director, DNA's recommendation and requested DNA to prepare a concept plan that would include the proposed scenario, the anticipated participants, and details of the estimated cost of the exercise. DNA by letter (22 Sep 76) tasked Field Command, Defense Nuclear Agency (FCDNA) to take the lead in developing an exercise concept, including a proposed scenario, anticipated participants, and detailed estimated costs, which would be distributed during January 1977 for coordination by appropriate Service/Agency headquarters. DNA, Service and ERDA action officers met at Headquarters DNA on 6 October 1976 to discuss basic concepts, to determine exercise participants, to develop a schedule of major milestones, and to discuss the two potential exercise sites. Applicable portions of the JCS Exercise Manual (JEM), Volume 1, were used as a guide for exercise planning and development. It was also agreed that project officers from designated subordinate organizations would participate in the planning and conduct of the exercise. Designated Service and ERDA project/action officers attended a planning conference conducted by FCDNA from 15-19 November 1976 and developed the proposed concept, scenario, exercise objectives and essential elements of the exercise. Two proposed exercise sites, Kirtland AFB, NM and ERDA's Nevada Test Site were examined and evaluated. The project

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*ERDA was redesignated Department of Energy (DOE) 1 October 1977.

officers subsequently provided specific analysis information and estimated cost data. Final agreement on the content of the Concept and Analysis Plan was achieved by DOD and ERDA project/action officers at the FCDNA Resolution Conference on 8 and 9 February 1977. This plan was submitted to ATSD(AE), the Services, and ERDA for approval in March 1977. The following are extracts from the Concept and Analysis Plan:

"D. Initial Planning Guidance: The Director, DNA provided initial concept guidance in a 22 September 1976 tasking letter.

"1. The primary objectives for the development of this exercise are to provide joint DOD/ERDA training for response to a major nuclear weapon accident, to promote greater interest in nuclear accident exercises, and to identify nuclear weapon accident response and coordination problem areas.

"2. The following exercise elements were identified for planning purposes.

"a. "On-Site" exercise play should be 5-7 days.

"b. There will be three phases in the concept of the exercise: site preparation; execution; and site restoration. (Identified as the Pre-execution Phase, Execution Phase, and Post-Execution Phase in the Exercise Design (IV.B.))

"c. Radioactive material with a short half life, and inert nuclear training devices will be used to maximize realism and training.

"d. The proposed scenario should not restrict the selection of the exercise site to a specific location or area.

"e. Planning should lead to the execution of the exercise in the 2nd or 3rd Quarter of FY 1979.

"3. Planning Milestones: Planning by project officers of participating organizations was scheduled in order that the Exercise Concept and Analysis Plan would be published during February 1977 for review and approval by Washington area headquarters during March 1977. It is anticipated that the Exercise Plan (EXPLAN) development guidance to the participants would be issued in April 1977. Supporting EXPLANS would be submitted for consolidation in September 1977. Funding for the exercise would be submitted in the appropriate FY79 Budget prior to 1 October 1977. DNA's proposed funding options will be submitted with the Exercise Concept and Analysis Plan. It is expected that the consolidated EXPLAN will be completed in November 1977, coordinated by the participants in December 1977, and receive appropriate

Headquarters' approval early in 1978. The exercise is being proposed for execution in 2nd or 3rd Quarter FY79 (specifically, March or April 1979). The exercise critique and publication of the final report would be completed during 4th Quarter FY79.

"II. SECURITY INSTRUCTIONS: All unclassified information concerning the proposed Joint DOD/ERDA Nuclear Weapon Accident Exercise, commencing with the publication of the Concept and Analysis Plan were marked "For Official Use Only." During the development of an EXPLAN, certain annexes would be disseminated on a "Control Eyes Only" basis for those personnel designated exercise project officers/controllers/trusted agents.

"III. EXERCISE CONCEPT:

"A. Scenario: A USAF C-141 aircraft with six nuclear weapons on board is enroute from the Pacific area to California and Nevada to deliver the weapons to service depots prior to sample laboratory testing. Because of adverse coastal weather conditions, the C-141 is diverted. While diverting to the alternate destination, the aircraft suffers a major in-flight malfunction and attempts a crash landing over open terrain. The C-141 breaks up and burns. Three nuclear weapons are destroyed by fire and resultant HE explosions. Three weapons (an AF B61-2, Army W70-2 and a Navy W68-0)* are damaged. The aircraft crew is injured and contaminated. Notification of the accident emanates from the aircraft and from local personnel on the ground. The nearest military installation and state disaster/emergency agencies are notified. An Exercise OPREP-3/PINNACLE "Simulated Broken Arrow" message is submitted to the National Military Command Center (NMCC). Headquarters, Energy Research and Development Administration (ERDA) and the Joint Nuclear Accident Coordinating Center (JNACC) are notified. The DOD and ERDA response organizations respond and conduct operations at the accident scene as outlined in the Exercise Design (IV.B.).

"B. Exercise Design Factors:

"1. The exercise is based on a DOD nuclear weapons accident (simulated), which poses a radiological hazard (simulated) to civilian life and property within CONUS. This accident is designed to be a Category II incident, as described by the Federal Preparedness Agency (FPA) in the Federal Response Plan for Peacetime Nuclear Emergencies (FRPPNE).

"2. The scenario involves radioactive contamination and damage to weapons belonging to three of the services (USA, USN and USAF) which were designed by both laboratories: Lawrence Livermore Laboratory (LLL) and Los Alamos Scientific Laboratory (LASL). This mix of weapons will allow the exercise of render safe procedures (RSP) by the appropriate Service Explosive Ordnance Disposal (EOD) units and design laboratories' weapon specialists. The logistic movement by C-141 aircraft of a service mix of weapons is often conducted when returning weapons from overseas units to service depots in preparation for sample laboratory testing.

*Final EXPLAN changed weapons to B61-1, W70-2, and B43.

"3. Decisions concerning the scenario, exercise design, and participants were based on the assumption that there will be subsequent exercises in which numerous alternatives, not selected for this first exercise, could be employed.

"4. The exercise will be conducted on federal property due to political, public affairs, and security considerations.

"5. The exercise is designed to deploy accident response forces of the Services and ERDA to a distant "field" location, and to exercise selected Service and ERDA response procedures.

"6. Federal agencies, other than DOD and ERDA, which are signatory to the Interagency Radiological Assistance Plan (IRAP) or identified in the FRPPNE, may be requested to participate on a limited basis and/or be invited to send observers. Major participation by these agencies, however, is recommended for subsequent exercises.

"7. DOD and ERDA will invite appropriately qualified observers from Canada, United Kingdom, Australia and New Zealand in accordance with member nation agreements of the Air Standard Coordination Committee, Working Party 94 (ASCC/WP94).

"8. The exercise must be conducted with at least "limited notice" to the major participants. A "no-notice" exercise would be unrealistic and probably detrimental to the conduct of the exercise. Service accident response organizations are alerted of logistical movements of nuclear weapons. Major participants must know in advance of a general requirement for their resources in order that scheduled activities will not delay the conduct of the exercise play which compresses three "real time" weeks into seven consecutive exercise days.

"9. To avoid unnecessary complexity and demands upon limited resources, employment of ERDA's Nuclear Emergency Search Team, (NEST), or the DOD's Stockpile Emergency Verification (SEV) is precluded in this exercise.

"10. The DOD and ERDA expenditure of funds for the conduct of this exercise will be consistent with limited exercise objectives, necessary exercise elements and realistic concepts.

"11. An effective Exercise Control Group (ECG) in combination with a skilled umpire team to observe, record, evaluate and critique performance, is required. Exercise controllers and umpires should be the most knowledgeable personnel in nuclear accident response and related areas.

"12. This exercise is to be a training and evaluation vehicle for the participants, and should not become a demonstration of approved procedures for visitors and observers.

"13. The Post-Exercise Phase will require an analysis and evaluation of exercise conduct, field critiques, consolidated post-exercise critiques, and a final exercise report, which will be distributed for the benefit of all nuclear accident response organizations and training institutions.

"14. The techniques and procedures employed in the first exercise of a joint DOD and ERDA nuclear weapons accident response will be recorded in a documentary film.

"C. Major Exercise Objectives:

"1. To provide a realistic training vehicle for DOD and ERDA nuclear accident response organizations.

"2. To determine the effectiveness of the nuclear accident response equipment, procedures, techniques, directives and plans of DOD and ERDA.

"3. To determine the effectives of an interservice change of command, and the coordination and communications of a multi-Service and ERDA accident response force.

"D. Principal Exercise Elements: To test and evaluate:

"1. Deployment and operating capabilities of response forces at a distant site.

"2. Safety, survey, monitoring and decontamination procedures using radioactive materials with short half-lives to simulate wide spread contamination resulting from nuclear weapons destroyed by fire and high explosives.

"3. EOD Render Safe Procedures by using inert, modified, nuclear weapons trainers to simulate damaged weapons.

"4. ERDA laboratory weapon specialists' assistance which may be required in the area of EOD Render Safe Procedures, weapon component identification, classification and security.

"5. DOD and ERDA capabilities and procedures for collecting, packaging, and shipping of contaminated material and debris. (Shipment of material will be simulated.)

"6. DOD logistic support for DOD and ERDA response organizations.

"7. DOD radiological emergency medical procedures and capabilities to include DOD and ERDA environmental health procedures.

"8. Existing interservice change of command, control and coordination procedures used by DOD On-Scene Commanders with a multi-Service and ERDA accident response force.

"9. Existing communication equipment and reporting procedures used by the DOD/ERDA accident response force.

"10. Existing DOD public affairs policy by simulating press and media involvement.

"11. DOD's National Military Command Center (NMCC) and ERDA's Emergency Action and Coordination Team (EACT) decision making policies and procedures in response to a nuclear weapons accident.

"12. DOD and ERDA's existing instructional material and training courses directly relating to nuclear accidents, for identification of possible new training requirements and changes to interservice and interagency training programs.

"E. Major Participants:

"1. The National Military Command Center (NMCC).

"2. Headquarters Emergency Operations Center, ERDA (ERDA/HEOC).

"3. The Joint Nuclear Accident Coordinating Center (JNACC).

"4. Elements of Military Airlift Command, USAF.

"5. Elements of Tactical Air Command, USAF (Nellis AFB, NV or Cannon AFB, NM).

"6. Air Transportable Radiac Package (ATRAP) and selected elements of Harvest Eagle, Air Force Logistics Command, USAF.

"7. Elements of the Occupational and Environmental Health Laboratory, Air Force Systems Command, USAF.

"8. Interservice Nuclear Weapon School, 3416th Technical Training Squadron, Air Training Command, USAF.

"9. 6th Army Nuclear Chemical Accident/Incident Control Team (Ft. Ord, CA or Ft. Carson, CO).

"10. 11th Naval District, EOD Team and Radioactive Contamination Monitor Team.

"11. ERDA Accident Response Group (ERDA/ARG).

"12. Albuquerque Operations Office, ERDA (ERDA/ALO).

"13. Nevada Operations Office, ERDA (ERDA/NVO).

"14. Lawrence Livermore Laboratory (LLL).

"15. Los Alamos Scientific Laboratory (LASL).

"16. Sandia Laboratories (SLA and SLL).

"17. Selected DOD and ERDA Headquarters, as appropriate.

"18. Others, as later identified.

"F. Evaluation of Proposed Exercise Sites:

"1. Proposed exercise sites at Kirtland AFB (KAFB), NM and the Nevada Test Site, NV were inspected and evaluated by Service and ERDA action/project officers. A comparative evaluation of these sites is contained in Annex B.

"2. The DOD and ERDA action/project officers recommend that NTS be used as the site for the first major nuclear weapon accident exercise, due primarily to NTS's remoteness, the availability of exercise support at NTS, and the adequacy of the NTS Environmental Impact Statement (EIS) (Annex C).

"G. Estimated Cost: (Detailed estimates at IV.G.)

SVC/AGENCY	KAFB	NTS
Army	$ 82,500	$ 42,500
Navy	8,475	7,965
Air Force	1,107,310	1,211,630
DNA	50,000	50,000
ERDA	66,710	114,515
TOTAL (FY77 Dollars)	$1,314,995	$1,426,610

"IV. EXERCISE ANALYSIS PLAN:

"A. Purpose: In support of the exercise concept, this analysis plan provides a description of the exercise activities and participants to be evaluated. The major exercise objectives are analyzed through the development of the specific exercise objectives of the DOD and ERDA participants. Support requirements and detailed cost estimates are included. The analysis plan will assist in the development of the Exercise Plan.

"B. Exercise Design:

"1. Pre-Execution Phase. Prior to the execution phase, the following actions are necessary:

"a. Establish the Exercise Control Group (ECG) and Umpire Team with personnel designated by the Services, DNA and ERDA. The ECG Director will be provided by DNA. The ECG Deputy Director will be provided by ERDA.

"b. Publish the Exercise Control Operating Instructions.

"c. Pre-position the Army Nuclear Accident/Incident Control (NAIC) Team at a simulated, small Army base.

"d. Prepare the exercise site with an USAF aircraft wreckage, simulated damaged nuclear weapons, and by the spreading of short half life radioactive material. Site preparation will be conducted by DOD and ERDA personnel under the supervision of the ECG. Elements of the Army NAIC Team will provide pre-exercise support, as required.

"2. <u>Execution Phase</u>:

"a. On order of the Director ECG, exercise notifications of the C-141 aircraft's flight plan modification, inflight emergency, and subsequent crash are released through the appropriate communication channels.

"b. The Army NAIC Team, as the response force from the closest military installation (simulated), receives accident notification, responds to the accident scene, commences initial accident response procedures, and requests local AFB support/assistance.

"c. Upon accident notification through the Joint Reporting System (JRS), the NMCC, ERDA/HEOC, HQ MAC, HQ 6TH ARMY, HQ 11TH NAVAL DISTRICT, the JNACC local military installations, the regional ERDA office, and appropriate Service Headquarters commence procedures to establish command and control, accident response, and joint coordination.

"d. Response units commence deployment to the exercise site.

"e. Command and control at the accident scene will be established by the Army NAIC Commander, and passed to the designated USAF On-Scene Commander from MAC. All Service and ERDA response elements will be utilized by the On-Scene Commander, as required.

"f. USAF logistical elements will support the joint DOD/ERDA accident response force.

"g. HQ MAC will provide required airlift support for the ERDA Accident Response Group (ARG) and DOD response forces.

"h. Additional Air Force, Army, Navy, and ERDA support elements will travel to the accident scene by military or commercial aircraft.

"i. Local DOD and ERDA vehicles will be used to transport response units from the nearest air head to the accident scene.

"j. All necessary nuclear accident response procedures, including casualty handling, mortuary affairs, radiological health team support, contamination control, decontamination, recovery, salvage, public affairs, legal assistance, security, equipment maintenance, communications, and accident reporting will be exercised.

"k. Initial response forces will subsist on field rations, until a camp facility is established. Selected elements of the USAF Harvest Eagle package will provide the necessary support for all exercise players. Controllers, umpires and observers will billet and subsist in an established facility separate from the exercise area, in order to limit unrealistic support requirements affecting exercise play.

"1. The progress of the exercise, the employment and evaluation of all response activities will be monitored, and controlled as necessary by the ECG. Umpire team personnel will observe and evaluate all activities. A DNA systems analyst will obtain, and record all data acquired by the ECG and Umpire Team as specified in the Data Collection Plan, developed as part of the EXPLAN. ECG and umpire personnel will conduct "on-the-spot" critiques upon completion of each scenario event or activity.

"3. <u>Post-Execution Phase</u>:

"a. Exercise site restoration will be accomplished by DOD and ERDA personnel.

"b. DOD/ERDA response forces will return to parent organizations after the termination of the Exercise.

"c. ECG and Umpire Team will consolidate evaluation data in accordance with the ECG Operating Instructions and the Data Collection Plan.

"d. An on-site Wrap-up Conference will be conducted by the ECG Director with the principal representatives of the DOD/ERDA response forces.

"C. <u>Exercise Objectives</u>:

"1. Operations. To exercise and evaluate the operational effectiveness of Service and ERDA nuclear accident response organizations/units/elements, and their equipment, procedures, techniques, directives and plans, when engaged as part of a joint DOD/ERDA response force responding to a peacetime accident involving nuclear weapons in the custody of the DOD.

"2. Command and Control. To exercise and evaluate the effectiveness of the change of command, control and coordination procedures of responding DOD and ERDA forces.

"3. Logistics. To exercise and evaluate the logistics support capability of elements of MAC, the Tactical Air Command (TAC), Air Force Logistics Command (AFLC).

"4. Medical and Radiological Health Services. To exercise and evaluate the radiological emergency medical procedures and capabilities of: elements of TAC; the Army's Radiological Advisory Medical Team (RAMT); health physicists and radiation medicine personnel of the ERDA Accident Response Group; and a team from the USAF Occupational and Environmental Health Laboratory (OEHL) of AFSC.

"5. Render Safe Procedures. To exercise and evaluate the capabilities and procedures of EOD teams in rendering safe a simulated damaged nuclear weapon of each Service, and to evaluate the capabilities of the appropriate laboratory weapon specialists of the ERDA/ARG in advising and assisting the On-Scene Commander and the EOD teams.

"6. Communications. To exercise and evaluate the communications equipment and reporting procedures in support of DOD and ERDA requirements.

"7. Public Affairs. To exercise and evaluate the public affairs procedures of all elements of the DOD/ERDA response force, and to evaluate the adequacy of the existing DOD public affairs policy for simulated media and public involvement. (The EXPLAN will outline procedures to address actual media and public interest in the exercise, if any.)

"8. Recovery and Salvage. To exercise and evaluate the capability of participating USAF elements, with assistance from the ERDA/ARG, to recover, package and prepare to ship weapon components and contaminated material; and salvage noncontaminated material.

"D. Evaluation Objective and Performance Criteria: The exercise evaluation objective will be to determine the successful accomplishment of all exercise objectives. The exercise evaluations pertain to the joint DOD/ERDA accident response force, and to the individual DOD and ERDA participants identified in the Exercise Design. The evaluations will be based on the overall effectiveness of required actions, to include the organization's capability to respond, timeliness of response, knowledge of procedures, adequacy and condition of equipment, and the ability to work with other groups comprised of all Services and ERDA personnel. Performance criteria for this first exercise will be based on existing directives and procedures. This exercise will serve as a basis, where feasible, for establishing performance data and criteria for evaluations in subsequent exercises.

"E. Exercise Support Requirements:

"1. Provided by ERDA:

"a. Modified, inert weapon trainers (LLL and SLA).

"b. Short half life radioactive material (LLL).

"c. Simulated damaged nuclear weapon components (SLA and SLL).

"d. Transportation of weapon trainers, radioactive material and weapon components from laboratories to exercise site.

"e. Contaminated laundry service (NTS only).

"f. Bus transportation for controllers/umpires (NTS only).

"g. Billeting for controllers/umpires (NTS only).

"h. Site preparation and restoration (NTS only).

"i. Assistance to DOD in site preparation and restoration (KAFB only).

"j. Vehicle transportation for ERDA/ARG from air head to exercise site.

"k. Exercise Control Group and Umpire personnel.

"l. Radio frequency spectrum clearance and authorization for DOD/ERDA units (NTS only).

"m. Liaison with state officials.

"n. Security support (NTS only).

"2. Provided by DOD:

"a. Aircraft wreckage (USAF).

"b. C-141 transportation (2 missions) of ERDA/ARG.

(1) LLL and LASL equipment to NTS, or

(2) LLL and EG&G equipment to KAFB.

"c. Field messing and billeting for approximately 470 personnel (USAF-MAC or TAC).

"d. Emergency medical services, if required (USAF).

"e. Communications support for ERDA/ARG: teletype, unsecure phone, HF radio ties with ERDA emergency radio system.

"f. Contaminated laundry service (USAF-KAFB only).

"g. Transportation for controllers/umpires (KAFB only).

"h. Billeting for controllers/umpires (KAFB only).

"i. Site preparation and restoration (KAFB only).

"j. Assistance in site preparation and restoration (NTS only).

"k. Transportation from air head to exercise site.

"l. Exercise Control Group/Umpire personnel.

"m. Radio frequency spectrum clearance and authorization for DOD/ERDA (KAFB only).

"n. Radiac instrument maintenance (USAF).

"o. Security support (KAFB only).

"F. Deployed Personnel Summary (estimated):

ERDA/ARG	56	(56)
Army NAIC Team	82	
EOD Team	4	
RAM Team	6	
RADCON Team	9	(101)
Navy EOD Team	4	
RADCON Team	6	(10)
USAF Initial DRF	40	
MAC DRF	40	
OEHL Team	5	
Recovery Team	30	
Support Personnel	150	(265)
Total DOD/ERDA Response Force	432	(432)

Controllers/Umpires	
ERDA (5/15)	20
Army (3/7)	10
Navy (6/6)	12
USAF (15/25)	40
Interservice Nuclear Weapons School (2/6)	8
DNA/FCDNA (3/0)	3
Total Controllers/Umpires	93

"G. Detailed Estimated Costs (FY77 Dollars):

SVC/AGENCY	ORGANIZATION/ACTIVITY	KAFB	NTS
ERDA	Accident Response Group	$ 16,710	$ 16,715
	Control group/Umpires	20,000	20,000
	Support	30,000	77,800
	(TOTAL)	($ 66,710)	($ 114,515)
Army	NAIC Team	$ 50,000	10,000
	EOD Team	1,000	1,000
	RADCON Team	25,000	25,000
	RAM Team	2,500	2,500
	Control Group/Umpires	4,000	4,000
	(TOTAL)	($ 82,500)	($ 42,500)
Navy	EOD Team	$ 350	$ 200
	RADCON Team	700	400
	Transportation (A/C)	525	525
	Control Group/Umpires	6,900	6,840
	(TOTAL)	($ 8,475)	($ 7,965)
DNA	Documentary Film	$ 40,000	$ 40,000
	Exercise/Control	10,000	10,000
	(TOTAL)	($ 50,000)	($ 50,000)
Air Force	Initial DRF (TAC)	$ 50,000	$ 50,000
	Hq MAC DRF and MAC Airlift	700,000	700,000
	OEHL (AFSC)	2,310	2,730
	ATRAP (AFLC)	5,000	5,000
	Harvest Eagle Package (TAC)	150,000	150,000
	Base Support	200,000	300,000

INWS		3,900
(TOTAL)	($1,107,310)	($1,211,630)
TOTAL ESTIMATED COSTS:	$1,314,995	$1,426,610

"ANNEX B TO CONCEPT AND ANALYSIS PLAN

"I. Exercise Site Evaluations: Two proposed exercise sites were visited by the Service and ERDA action/project officers and evaluated as follows:

"A. Interservice Nuclear Weapons School (INWS) Training Area, Kirtland AFB (KAFB), NM (See Appendix B-1-1, KAFB Map.)

"1. Advantages.

"a. Relative short distance (5 miles) from air head to exercise site.

"b. Close proximity to some probable controller and umpire personnel at INWS.

"c. Close proximity of billeting for controller, umpires, and observers.

"d. Cost estimates indicate that it would be less expensive than NTS. However, since the cost differential is less than ten percent, this advantage is considered relatively insignificant. (See Cost Estimates, Paragraph III.G.)

"2. Disadvantages.

"a. Inadequate Environmental Impact Assessment (EIA) which would require revision and approval.

"b. Limited access routes from air head to exercise area might hamper activities of tenant organizations at KAFB.

"c. Military takeoff and landings are restricted by a City of Albuquerque lease, and the increase in flight activity would have to be coordinated with the City of Albuquerque and Federal Aviation Agency.

"d. Proximity of exercise area to KAFB and Albuquerque might give rise to speculation and public alarm over the sizable increase in nuclear emergency response activity.

"B. Jackass Flats, Nevada Test Site (NTS), NV. (See Appendix B-2-1, NTS Map.)

"1. Advantages.

"a. Suitable Environmental Impact Statement exists. (Annex C.)

"b. Exercise activity and traffic will cause no interference with NTS activities.

"c. Security of this remote area will be controlled by the accident response forces, and there is little likelihood of public alarm.

"d. Adequate billeting, messing and transportation support are available from NTS and Nellis AFB, NV.

"2. Disadvantages.

"a. The closest C-141 air head facilities are at Indian Springs Air Force Station (AFS), NV (25 miles) and Nellis AFB, NV (65 miles), both realistic distances which require more vehicle transport and POL support than KAFB.

"b. Billeting at Camp Mercury, NTS for controllers, umpires and observers is limited to a maximum of 200 personnel.

"c. Cost estimates indicate that it would be more expensive than KAFB. However, since the cost differential is less than ten percent, this disadvantage is considered relatively insignificant. (See Cost Estimates, Paragraph III.G.)

"C. Conclusion. It was the consensus of DOD and ERDA action/project officers that the Nevada Test Site is the more desirable area for the first major nuclear weapons accident exercise. (See Paragraph III.F2.)"

b. The Concept and Analysis Plan was approved in April 1977 and ATSD(AE) directed that a detailed exercise plan be written and submitted for approval. Headquarters DNA conducted a Nuclear Weapons Accident Exercise (NUWAX) Planning Meeting 25-26 May 1977. The attendees were the action/project officers involved in the development of the Concept and Analysis Plan.

c. A draft Exercise Plan, EXPLAN, and Control Staff Instruction (COSIN) were distributed to guide the discussions. This meeting produced an EXPLAN outline with the COSIN as a separate annex. In June 1977, DNA tasked FCDNA to prepare a detailed EXPLAN. Each Service and ERDA was to coordinate and consolidate the input from their participating organizations, prior to submission on 31 October 1977, to FCDNA for inclusion in the Joint DOD/DOE EXPLAN. During the period 18-22 September 1977, the Air Staff project officer conducted the USAF NUWAX planning meeting at the Pentagon. Outside invited

attendees included the FCDNA project officer and the DOE/NVO project officer. Purpose of the meeting was to draft the USAF input to the Joint DOD/DOE EXPLAN. DOE/ALO submitted the DOE NUWAX EXPLAN on 26 September. The Army conducted its NUWAX planning meeting 13-14 October 1977 at the Presidio of San Francisco. Other Service/Agency attendees were FCDNA, DOE/NVO, and U.S. Navy project officers. The Navy NUWAX planning meeting was conducted at the U.S. Army Nuclear and Chemical Agency (USANCA) 8-9 November 1977. Other Service/Agency attendees were the project officers from FCDNA, U.S. Army and DOE/NVO. As of December 1977, no Service inputs had yet been received by FCDNA. FCDNA then published the first draft of EXPLAN NUWAX-79 and requested comments from the Services and DOE and announced a finalization conference to be held 28 February-2 March 1978.

d. From the Service/Agency inputs gathered during this conference at DOE/NVO in Las Vegas, NV, a second draft NUWAX-79 EXPLAN was published on 28 April 1978 and comments/recommended changes were requested. Also, in April 1978, DNA requested that the Services and DOE submit nominations of personnel to be on the ECG which would, now that initial planning was completed, see the exercise through to completion. Several members of the ECG traveled to England to observe the UK SENATOR VI exercise 5-17 June 1978. The experience and knowledge gained by the ECG members during this visit proved to be invaluable to the continued planning of NUWAX-79. Specific examples are:

(1) An administrative entry point, in addition to the player-established hot line, was established to preclude interference with the player entry point.

(2) Because of reduced activity during significant periods of time, it was realized by the U.S. observers at the SENATOR VI exercise that some activity should be scheduled to fill this void for NUWAX-79 observers.

(3) The U.S. observers often did not know what activities were scheduled or anticipated for the day or what had been accomplished the previous day.

(4) The UK conducted a "quick look" course to educate the U.S. observers on how the UK responded to nuclear weapons accidents.

e. During the spring of 1978, work began on Annex X of the EXPLAN which was the COSIN to be published separately for controller eyes only. On 2-3 May 1978, the FCDNA and DOE project officers met at Los Alamos to write the initial draft of the COSIN with inputs from the Services. On 5 May, this first draft COSIN was distributed to the ECG for comment. The final NUWAX-79 EXPLAN was distributed for approval to JCS, OSD, ATSD(AE), Services, and DOE/MA on 5 June 1978. On 30 June 1978, after approval had been received, the final EXPLAN was distributed in accordance with Annex Z of the EXPLAN.

f. The ECG held its first conference 28-29 June 1978 at FCDNA to review the exercise scenario for completeness, review the exercise chronology and Master Scenario Events List (MSEL) for completeness and continuity, discuss communications requirements for the ECG, discuss how public affairs would be conducted, review the data collection plan of the COSIN, determine the number of umpires required for the exercise, and discuss documentation of the exercise and the reports required during the pre-execution, execution and post-execution phases of the exercise.

g. The final draft COSIN was distributed on 6 October 1978. On 24-26 October 1978, the Exercise Control Staff (ECS), formerly ECG, met at DOE/NVO to finalize the COSIN. On 24 October, the ECS visited the proposed NTS exercise site, Harvest Eagle site, the Administration and Engineering (A&E) building at the old Nuclear Rocket Development Station (NRDS), and Camp Mercury

facilities. As a result of the site visit, the precise location of the simulated accident and Harvest Eagle were determined. It was also decided that roads leading to the crash site and the administrative hot line should be constructed prior to moving the aircraft wreckage onto the site. On 25 and 26 October 1978, the following decisions were made:

(1) The 820th Civil Engineering Squadron (CES) RED HORSE, Nellis AFB, NV would erect Harvest Eagle starting at D-21 and finishing on D-6. RED HORSE would do this as part of their annual training at no cost to NUWAX-79. From D-6 through exercise termination, RED HORSE would keep a caretaker force at Harvest Eagle.

(2) The USN project officer was to determine if it was possible for the USMC to provide a 20-man security force to the ECS to secure classified material prior to D-day after which security would be the responsibility of the On-Scene Commander (OSC) as approved by the ECS security controller.

(3) Transportation requirements were discussed in much detail. DOE NV would provide bus transportation funded by DOD. Transportation requirements determined were 5 buses and 27 vehicles for the entire exercise and 5 buses and 4 vehicles for visitors and press for 1 day only (D+2).

(4) In order to determine how much of the Harvest Eagle package was required for this exercise, an estimate of participants was made. Numbers of personnel expected were as follows: Army 123/2 senior (06 and above), Navy/Marine 40/1 senior, Air Force 250/7 senior, DOE 58/4 senior, and 20 USMC security personnel for ECS.

(5) The names of visitors selected by the Services/DOE were to be provided to FCDNA no later than 15 January 1979 to enable FCDNA to send invitations in a timely manner.

(6) The names and DOE Forms 277 were to be provided FCDNA for observers as selected by the Services/DOE no later than 1 February 1979.

(7) Press day for the exercise had been requested for D+1; however, the Exercise Director stated this was not satisfactory because during the time the press was in the area the exercise may essentially stop due to the press not being cleared for Secret Restricted Data material. He offered the alternative that on-site press day be in conjunction with visitors day on D+2. He stated that if the press was uneasy with waiting that long a press briefing at the NUWAX-79 press center at DOE/NVO could be conducted on D-day or D+1 followed by a site visit on D+2. This procedure was adopted.

(8) A Technical Scenario Working Group (TSWG) was formed to perform detailed planning for site preparation.

h. The NUWAX-79 COSIN published on 6 October 1978 was reviewed and approved for final edition to be distributed on 15 December 1978. During the period 14-15 December 1978, the Technical Scenario Working Group of the ECS met at the Presidio of San Francisco to finalize exact weapon emplacement and contamination spreading for a downwind pattern. Key decisions made at this conference were:

(1) Sixth Army would task Fort Carson to provide a CH-47 helicopter to the working group for aircraft emplacement.

(2) Sixth Army would task their riggers to rig the aircraft pieces for CH-47 lift.

(3) Sixth Army would task the 259th EOD to assist the working group in accomplishing the cosmetic damage to the aircraft and the making of craters caused by the detonated weapons.

i. During the period 15-19 January 1979, the ECS met at FCDNA, KAFB, NM. The staff attended a 1-day presentation of the Senior Officer Nuclear Accident Course (SONAC) conducted by the Interservice Nuclear Weapons School. The remainder of the conference was devoted to meetings of the ECS and presentations by each of the Services and DOE on how response teams respond to an accident exercise. Change 1 to FCDNA EXPLAN NUWAX-79 was finalized, approved, and published on 12 February 1979. Draft implementing instructions were initiated for logistics, communications, personnel, safety, security, public affairs and financial support for the exercise. Organizations for the ECS, Exercise Support Group (ESG) and umpires were developed. The Master Scenario Events List (MSEL) implementers were reviewed and approved. A draft radiological safety plan (including a review of preparation and construction jobs) was approved. Finally, the information to be presented to the On-Scene Commanders was reviewed. Specific tasks were assigned to various Service/Agencies/Laboratories with completion dates. Tasks were assigned in the areas of exercise control, radiological safety, security, communications, logistics, site preparation and site restoration.

j. Due to the infeasibility of bringing the entire ECS together, a FCDNA task group was formed after the January 1979 meeting to monitor, initiate, and review plans and preparations for NUWAX 79. The task group was organized in the following areas: Plans; Logistics/Engineering; Comptroller; Radiological Safety; Administration; Communications; Safety; Public Affairs; Legal; Visitor/Observer; Documentation; Security; and NUWAX Coordination Center. Details of activities of the groups are found in subparagraphs 6a. thru 6m. The functional officials presented weekly updates to the ECS Chief of Staff and the entire group met on Saturdays to present the latest status, review programs, and resolve problems.

k. On 19-21 March, the ECS met for the final time prior to assembling at NTS for the exercise. The meeting included an update on plans/preparation from each of the FCDNA task group functional areas. A complete day of orientation/training was conducted for the umpire group. Meetings were conducted with the following working groups; Exercise Control; Communications; Logistics/Engineering; Security; Public Affairs; Visitor/Observer; and Radiological Safety. Final review of plans, implementing instructions, MSEL implementers, Exercise Control Staff functions, and operating and reporting problems were accomplished. A final revised COSIN was published as a result of changes made at the 19-21 March meeting. Reporting dates to NTS for various members of the ECS were promulgated on 28 March 1979. During the week of 9-14 April, the ECS, ESG and Umpires arrived at NTS. During the period prior to D-Day, the staff received orientations, reviewed communication procedures and equipment, revised MSEL implementers, and supported the Technical Scenario Working Group in emplacement of weapons and components, contaminant spreading and refining operating procedures for control of the exercise. By D-Day, all planning and preparations for the exercise had been completed.

3. <u>MISSION AND OBJECTIVES</u>:

a. The mission of NUWAX-79 was to exercise the deployment of accident response forces of the Services and the DOE to a distant and remote field location, and to test/evaluate selected response and coordination procedures during a simulated accident which results in the burning and high explosive dispersal of nuclear weapons material.

b. The broad objectives planned for exercise were as follows:

(1) To provide a realistic training vehicle for DOD and DOE nuclear accident response organizations.

(2) To determine the effectiveness of the nuclear accident response equipment, procedures, techniques, directives and plans of DOD and DOE.

(3) To determine the effectiveness of an interservice change of command and the coordination and communications of a multi-Service and DOE accident response force.

4. <u>EXERCISE SCENARIO</u>: Appendix 1 to Annex X to Joint DOD/DOE EXPLAN NUWAX 79 Technical Scenario is quoted in its entirety.

"1. <u>Background Assumptions</u>.

"a. A USAF/MAC C141 is transporting six nuclear weapons (and other components) from Barbers Point NAS, HI to Sierra/Amadee Air Field, enroute to Amarillo (PANTEX). Adverse weather in central California necessitates overflight of Sierra/Amadee Air Field to the alternate destination at Nellis AFB. The aircraft encounters severe clear air turbulence at 16,000 feet over the southern Nevada desert, resulting in inflight structural failure and an uncontrolled crash. A partial distress (Mayday) message is transmitted by the stricken aircraft giving only the aircraft identity. No further radio contact is possible.

"b. The distress message is received by the regional air traffic controller and by flight operations at Nellis AFB, NV, and Edwards AFB, CA. A Nye County Deputy Sheriff on patrol near Mercury, NV observes a distant flash and smoke northwest of Mercury and reports a possible crash of an unidentified aircraft giving the time and approximate location to the Army Element Commander. This report is relayed to Nellis AFB. A tourist traveling on US 95 near Lathrop Wells, NV also observes the crash but mistakenly reports the location to the Army Element Command to be SSW of Lathrop Wells instead of the correct NNE direction. This report is also relayed to Nellis AFB.

"c. On the basis of loss of radio and radar contact by the air controller and subsequent crash reports, a Broken Arrow message is sent to the National Military Command Center (NMCC) by Nellis AFB Command Post.

"2. <u>Pre-Crash Aircraft Configuration</u>.

"a. Crew: Pilot, Copilot, Navigator, Flight Engineer, 3 Loadmasters.

"b. Cargo: Nuclear weapons and weapon components, consisting of

2 - B61-1 stored singly in H 1012 containers
2 - B43 (USN/USMC) stored singly in H 695A containers
2 - W70 (warhead section) in transport containers
2 - Sets 992T-2 target rings (tuballoy) stored in H 1343 containers.

"3. Aircraft Descent and Impact. An inflight wing failure results in a violent, uncontrolled descent accompanied by structural failure and separation of fuselage into two (fore and aft) sections. The two fuselage sections impact about 50 meters apart. The forward fuselage section, minus one wing, impacts on the side of the missing wing. An engine tears free of the opposite wing section and crashes downward into the cargo compartment. Those portions of the fuselage containing the cockpit, liquid oxygen (LOX) containers, aircraft batteries, and cargo compartment near the wing root survive the impact and subsequent fire. The major tail components (horizontal and vertical stabilizer) also survive relatively intact; otherwise, the fuselage/cargo compartment is destroyed.

"4. Cargo.

"a. A B61 and B43 weapon are torn free of the descending aircraft and fall independently impacting about 200 meters from the main aircraft wreckage. Both weapons penetrate the earth a few meters and detonate (high order). Shallow craters are formed and components are scattered over about a 250 meter radius; special nuclear material (SNM) contaminants spread as a cloud and are also mixed deep in the craters.

"b. A W70 and the target rings in H-1343 containers remain attached to the aft fuselage section during the descent; upon impact the W70 detonates, scattering components within about 200 meters and spreading SNM over the main aircraft area. A large fragment from the W70 strikes the H 1343 and scatters the tuballoy 992T-Z target rings along a 150 meter path away from the main wreckage site. Four of the target rings are broken. Some of the components bury into the soil a few centimeters upon impact.

"c. In the forward fuselage section, an engine has come to rest on the other W70 in such a manner as to require its removal before safing procedures can begin. The B43 is also imbedded in the forward cargo section posing an access problem.

"d. A B61 is intact but free falls and penetrates the earth's surface no less than 2/3 the length of the bomb without detonating.

"5. Crew Members. None of the aircraft crew survive the crash. The pilot, copilot, and navigator are in the cockpit area and are contaminated. The other(s) are thrown free during descent and fall within about 500 meters of the wreckage and are uncontaminated."

5. NUWAX-79 ORGANIZATIONS:

a. Exercise Control Staff. The Exercise Control Staff was formed to provide command and control to all exercise functions and to insure a timely flow of events which would insure accomplishment of the overall exercise objectives. Specific areas of responsibilities were established and exercise control functions were delineated as follows:

- NVO LIAISON - - - - - - - - - - EXERCISE DIRECTOR
  - PAO
  - LEGAL
  - UMPIRES
  - DEPUTY
    - CHIEF OF STAFF
      - Operations
        - Photographic Unit
      - Medical/ Radiation Safety
      - Communi- cations
      - Security
      - On-Site Service Element Controllers
      - Off-Site Contacts

---------Exercise Coordination

_________Exercise Control

b. Umpire Group. The Umpire Group was established so that the overall player actions could be evaluated and to insure timely compliance with the exercise scenario schedule. Technical competence, safety and security were monitored by the umpire group as follows:

- CHIEF UMPIRE
  - DEPUTY CHIEF UMPIRE
    - REMOTE OPERATIONS
      - JNACC (DOD/DOE)
      - SERVICE HQS
      - DOE/EACT
      - DOE LABORATORIES
        - LASL
        - LLL
        - SANDIA
      - NELLIS AFB
      - (Cont.)
    - ON-SCENE OUT-CORDON OPERATIONS OFFICER
      - COMMAND & CONTROL
      - LOGISTICS
      - COMMUNICATIONS & REPORTING
      - MEDICAL
      - BIOENVIRONMENTAL
      - HEALTH PHYSICS
      - LEGAL
      - (Cont.)
    - ON-SCENE IN-CORDON OPERATIONS
      - COMMAND & CONTROL
      - EOD
      - RADCON

NMCC

- SECURITY
- SCIENTIFIC SUPPORT
- PUBLIC AFFAIRS

c. Exercise Support Group. The Exercise Support Group was established to provide administrative, comptroller, communications, security, safety, logistics, and visitor/observer support and coordination for the Exercise Director throughout the planning and operational phases of the exercise as follows:

EXERCISE SUPPORT GROUP

ADMINISTRATION | COMPTROLLER | COMMUNICATIONS | SECURITY | RADIATION SAFETY | LOGISTICS | VISITOR/OBSERVER

6. <u>PRE-EXERCISE PLANNING</u>:

a. Plans. Plans Division, Plans and Operations Directorate, FCDNA was responsible for developing the concept and analysis plan, exercise plan, control staff instruction and the exercise organization and functions document. The division was involved with NUWAX-79 planning, execution and documentation from conception through final documentation tasks. The division also planned the exercise control staff meetings and monitored the operation of the NUWAX Coordination Center established in February 1979 at FCDNA. Detailed discussion of the development of the various plans, supporting documents and instructions is found in paragraph 2., Background. Highlights of exercise control staff meetings and other major items of interest in the planning phase are found in that discussion. Operation of the NUWAX Coordination Center is discussed in paragraph 6.m. Plans Division also prepared and presented a number of briefings including:

(1) Standard NUWAX-79 Briefing which was distributed to the primary project officers of all Services and agencies. This briefing served as the primary vehicle in the pre-exercise briefing program. Key officials briefed were as follows:

(a) Assistant to Secretary of Defense (Atomic Energy) - 12 October 1978.

(b) DOD/Service Officials - 1-2 November 1978.

(c) DOE Assistant Secretary for Defense Programs - 1-2 November 1978.

(d) On-Scene Commanders - 9 February 1979.

(e) National Security Council Staff - 7 March 1979.

(f) Nevada Congressional Delegation - 8 March 1979.

(g) On-Scene Commanders - 22 March 1979.

(h) Governor of Nevada - 22 March 1979.

The briefing program was essential to the successful conduct of the exercise. Particularly important were the briefings of the Nevada Congressional delegation and the Governor of Nevada. These briefings provided answers to questions by public officials whose support was critical to the exercise.

(2) Briefing of the On-Scene Commanders on two occasions to discuss in detail exercise constraints and to cover all aspects of the radioactive contaminant used at the accident site, including the safety analysis and certain other portions of the radiological-safety plan.

b. Logistics/Engineering.

(1) Although discussed in general terms and outlined in the exercise plan prior to October 1978, it was not until the 24-26 October 1978 Exercise Control Staff (ECS) Conference (held in Las Vegas, NV) that detailed logistics planning was initiated. During that meeting, the following areas were identified for further study:

(a) Need for four wheel drive vehicles for off-road support.

(b) Construction of roads to crash site and hot line. At this time, the 820CES USAF Red Horse was appointed action agency. Because of labor union considerations, the eventual outcome was that this type of work was accomplished by the Reynolds Electrical and Engineering Company (REECO), the primary base contractor at DOE's Nevada Test Site (NTS).

(c) Deployment of the Harvest Eagle Package on D-21 to be fully operational no later than D-6.

(d) Site preparation for aircraft wreckage, bombs, craters, etc. Action agency was DOE/REECO under supervision of the ECS technical committee.

(e) Maps of the area.

(f) Need to coordinate activities with the nearby USAF MX Project at the NTS to avoid conflict.

(g) Vehicle requirements for player transportation should be self-supporting with Nellis AFB, as a player activity, providing the majority of the surface transportation support.

(h) Possible helicopter support by the USAF (based at Nellis AFB and operating out of Indian Springs) or the USA.

(i) Billeting and messing for USA players at Camp Mercury (D-2 to D-day); and other players (D-day thru D+6) at Harvest Eagle: USA 123, USN/USMC 40, USMC guards (non-player, D-4 onward) 20, USAF 250, DOE 58.

(j) Messing for visitors, observers, film crew, and press.

(k) Medical support capabilities of the Mercury Clinic and Nellis AFB hospital. Primary player care would be rendered by player medical resources.

(l) Acquisition of mannequins from Lovelace Foundation in Albuquerque.

(m) Radiological equipment support. Only a small fraction of items actually employed in radiological support were identified during the October conference; i.e., 12 sets of protective clothing for umpires and controllers (from USAF) and 200 sets of booties for the ECS, umpires and observers. The NTS (REECO) decontamination laundry was described as being capable of cleaning contaminated clothing within 24 hours.

(n) Nellis AFB AAFES support would be requested for deployment to the Harvest Eagle Camp. (A small base exchange truck was deployed during the exercise for player sundry and snack food support.)

(o) The requirement for tents for ECS umpires in Harvest Eagle Camp was identified.

(2) The most comprehensive review of logistics requirements occurred during the 15-19 January 1979 conference at FCDNA, Kirtland AFB, NM:

(a) Site preparation was discussed at great length. Delivery of the aircraft to the site would be accomplished by trucks contracted by the USAF from the USAF Military Aircraft Storage and Disposition Center (MASDC), Davis-Monthan AFB, AZ in early March 79. This schedule was subsequently advanced to the last week of February. Once offloaded at an area several miles north of the accident scene, the wreckage would be emplaced by CH-47 helicopters from Fort Carson, CO, USA, and Stockton, CA, USAR. Plans were made to have the helicopters remove the wreckage following the exercise.

(b) Detailed plans were developed on the accident site layout to include a 350-meter by 350-meter crash site area, a north administrative road 25-feet wide with a parking/bleacher area and bus turn-around area, and a 15-foot-wide player access road (bladed trail) with a parking area. The site layout

required a construction survey in the exercise area. Each survey point was associated with a known geodetic marker giving a longitude and latitude for that point. A site map, showing the results of the survey was requested during the conference.

(c) The Army's 259th EOD team from Fort Irwin, CA was programmed to place explosive charges in and around the aircraft wreckage to simulate craters from high-order explosions and airframe damage.

(d) Other site support planned included emergency lighting for the accident scene to aid in securing the classified weapons components scattered about, an air sampling program by REECO (DOE) during the period 15-26 April 1979, and sanitation, portable toilets and dumpsters by REECO.

(e) Subsistence planning was based on the assumption that most control staff noon meals and approximately 50 percent of the evening meals would be taken at the Harvest Eagle Camp's mess. This did not take place because of the "high" cost of noon and evening meals - $3.10 for personnel on per diem. Low-cost meals were available for the exercise control staff from DOE's Mercury Cafeteria, including sandwiches from vending machines.

(f) The 820th Civil Engineering Squadron presented a comprehensive briefing on plans for the Harvest Eagle Camp. A potential problem in this area was a shortage of shower/shave tents. (Adequate shower/shave tents were ultimately available for the exercise.) Representatives from DOE/NVO and FCDNA were assigned to prepare a detailed plan for billeting the controller, umpire, and support staff at Mercury, NV.

(g) Planning for ground transportation continued during this meeting. Planning was somewhat hindered at this point due to incomplete player vehicle requirements.

(h) A major decision was reached during the conference when it was concluded that DOE/NVO would provide all anti-contamination clothing (except breathing apparatus) for all player and non-player personnel. This procedure was adopted to avoid the problem of shipping contaminated clothing from the NTS following the exercise and to eliminate the possibility of introducing extraneous radioactive elements into player anti-contamination clothing at the NTS decontamination laundry. A later decision reached by the exercise chief of staff was that breathing apparatus would be provided by DOE for non-players, while players would wear their own masks. The use of player masks insured that sufficient eye glass inserts would be available and allowed players to adjust their masks to their individual needs.

(i) In other areas, arrangements were made for religious services at Harvest Eagle during the exercise and confirmation was received on the availability of mannequins for the exercise from the Albuquerque Lovelace Foundation.

(3) Representatives from FCDNA, DOE, LASL and Holmes and Narver Inc. met on 26 January 1979 to initiate the accident site survey for road construction. The site/construction survey took from 26 January to 2 February 1979 to complete.

(4) On 15-16 February 1979, a NUWAX-79 Financial Review and Tasking Meeting was held at DOE/NVO during which work order systems for FCDNA funding and requests for DOE/NVO support of the exercise were developed. During the conference, the NUWAX Program Location Map (#JS-025-094-C2), dated 14 February 1979, was distributed. The map included both a location plan and a plot plan. The plot plan was used in the construction of the exercise area and proved invaluable during the placement of the aircraft components, weapons components and contaminant. It was also used to pinpoint events that occurred during the exercise.

(5) On 6 and 7 March 1979, representatives from FCDNA visited the FCDNA liaison staff at NTS to discuss details of dozens of support requests that were pending action by REECO. As a result, most topics which required clarification were resolved on the spot. Several days following the 7 March visit, representatives from FCDNA also visited the site to discuss NTS support of the radiological safety/health programs associated with NUWAX-79.

(6) During the 19-21 March 1979 (Final) Planning Conference, reviews were conducted of most logistics areas; e.g., validation of deployed force numbers, surface and air transportation requirements, MEDEVAC procedures. Publication of the final edition of Exercise Implementing Instructions was accomplished subsequent to this meeting.

(7) Engineering activities in support of site activities began several weeks prior to D-day and continued throughout the exercise. Each of the exercise construction areas (helicopter pad, north administrative road, and player access road) were scraped, rolled, compacted and watered. Frequent watering, once an hour, provided dust suppression. Additionally, the helicopter pad and player parking areas were sprayed with oil. Approximately 20 working days were required by DOE (REECO) to construct the exercise area.

(8) The detailed logistics planning that preceded NUWAX-79 resulted in a highly successful operation. There are few locations in the United States where a more effective organization could be made available to support a nuclear weapons accident exercise. The combined knowledge, materiel and manpower resources of DNA and the DOE at a site where nuclear operations are the rule - not the exception - greatly enhanced the probability for mission success. It is essential that these unique combination of factors be carefully considered in the development of contingency plans to respond to nuclear

weapons accidents. Logistics support in an actual accident will be one of the most time-consuming and potentially limiting factors in such events. In NUWAX-79, few significant logistic problems were encountered because of the extensive and thorough planning that had occurred.

(a) Personnel and Equipment: In some instances, DOE assets which were available as a backup were used in lieu of player equipment; e.g., security lighting at the scene and heavy construction equipment. The following is a summary of major support functions provided by the DOE/REECO on site and illustrates support requirements that may arise during an actual accident:

1 ea	Environmental Radiological Base Station (van) - located at the administrative hot line for issuing anti-contamination clothing
6 ea	Floodlight standards with one generator - located around the exercise area both for security purposes and hot-line operations
*4 ea	Radiological air samplers - placed around the exercise area
*1 ea	Radiological road block monitor - installed at Gate 510T
1 ea	Floodlight standard with generator - located at Gate 510T
1 ea	Crane (Grove - with large rubber tires) with operator - used by players inside the hot line
1 ea	Back-hoe/front-end loader combination (track type) with operator - used by players inside the hot line
1 ea	Station wagon vehicle - located at the players' hot line for issuing anti-contamination clothing

*Personnel and equipment which could be utilized (deployed) in an ARG function.

*3 ea	Health physicists with monitoring equipment - stationed at the players' hot line
*2 ea	Health physicists with monitoring equipment - stationed at the administrative hot line
1 ea	Road watering truck with operator - used for dust control and compaction on all exercise utility roads, parking lots, etc.
1 ea	Wobbly wheel roller with operator - used in the Harvest Eagle area on roads, parking lots, etc.
1 ea	Roadgrading blade with operator - on standby near the exercise area
1 ea	Front-end loader with operator - on standby near the exercise area
1 ea	Rigging truck with welding equipment/iron workers equipment and operator - on standby at the players' hot line
1 ea	Service truck with operator - used for periodic servicing of portable toilets for the entire exercise area
1 ea	Service truck with operator - used for periodic servicing of trash dumpsters
1 ea	Nitrogen bottle with regulator and hose - used within the players' hot line
1 ea	Guard trailer - located at Gate 510T
1 ea	Low-boy trailer - used by players for communications equipment transport

*Personnel and equipment which could be utilized (deployed) in an ARG function.

*1 ea B-105 helicopter with pilot/crew - used for photo and radiological survey support in the exercise area (EG&G/LV)

*1 ea AF(Det 2) Huey helicopter with EG&G detector pods - used by players for area survey.

Photography and radiological survey data processed at EG&G/NV (USAF/EG&G)

4 ea Survey personnel - used for locating and mapping of classified weapon parts at the crash site (H&N)

15 ea Portable (Net 14) radios - used for actor communications, REECO, radiation safety, security, on-scene control personnel, (FCDNA/REECO)

18 ea Personnel (actors) - used as implementers; e.g. sheriff, pickets, TV/News/Press, cowboys, landowners

3 ea Personnel (actors) - acted as landowner's nephew, dunebuggy driver, and Assistant Secretary of Defense for Atomic Energy (DOE/NVO)

(b) Transportation: The 57TTW, Nellis AFB, provided most of the non-organic (assets not deployed with players) player surface transportation support. Estimates of vehicle requirements were developed in the months prior to D-day and proved to be reasonably accurate. Planned support was augmented during actual exercise play with two permanently assigned 57TTW vehicles (with drivers) and three pickups that had been reserved for the 57TTW for exercise contingencies. In addition, the OSC elected to airlift to Nevada several jeeps and 4-wheel drive trucks after D-day. POL was

*Personnel and equipment which could be utilized (deployed) in an ARG function.

furnished by the 57TTW Fuels Office. Air transportation requirements and plans for transporting players to the NTS were determined prior to the exercise. The plans were executed during the exercise.

<u>1</u>. All NUWAX Special Assignment Airlift Missions (SAAMs) were assigned a 6000-series number and were given an exercise priority of 2B2. Actual nuclear weapon accident response missions such as the on-call DOE/ARG SAAM 1005 are assigned a priority of 1A4 - commensurate with an actual emergency.

<u>2</u>. The following 6000-series SAAMs were flown during NUWAX:

<u>a</u>. D-2, 16 April 1979, SAAM flights 6002-01 thru 06 moved the U.S. Army NAIC team stationed at Ft. Ord, CA from the Monterey, CA airport to Nellis AFB, NV. Three aircraft flew two sorties apiece to complete this tasking which included 90 passengers and 66 tons of cargo.

<u>b</u>. D-day, 18 April 1979, SAAM flight 6000 transported 3 DOE/ARG personnel and 7.5 tons of equipment from LASL to the NTS. SAAM flight 6001 transported 5 DOE/ARG personnel and 20.9 tons of equipment from LLL to the NTS. SAAM flight 6003 transported 8 personnel, 3.8 tons of cargo and equipment and the USAF Air Transportable Radiac Package from Kelly AFB, TX to Nellis AFB, NV. SAAM flight 6006 moved RADCON teams from Naval Weapons Stations (NWS), Concord, CA and Seal Beach, CA and the Marine Wing Weapons Unit 3 RADCON team from MCAS, Yuma, AZ. It also transported the Marine EOD team from the 1st Force Service Support Group, Camp Pendleton, CA. Flight 6006 carried a total of 22 personnel and 5.8 tons of cargo and equipment.

<u>c</u>. D+1, 19 April 1979, SAAM flight 6004 transported both Army and Navy units to the NTS. Army units on flight 6004 included the Radiological Advisory Medical Team (RAMT) from Walter Reed Hospital, Washington, DC and the RADCON team from Aberdeen Proving Ground, Aberdeen, MD. Naval units included the RADCON team from NWS, Yorktown, VA and EOD Group 2, Ft. Storey, VA.

Flight 6004 carried a total of 10 personnel and 11.6 tons of cargo and equipment.

SAAM flight 6005 transported the 22AF DRF headed by BG Gardner, 22AF/CV, from Travis AFB, CA to Nellis AFB. A total of 83 personnel, 4 police dogs and 4.5 tons of cargo and equipment were transported.

SAAM flight 6007 transported the Joint Airborne Communications Center (JACC) from McDill AFB, FL to the Indian Springs Auxiliary Airfield, NV. On the flight were 5 personnel and 13.8 tons of cargo and equipment including 4 communication vans.

SAAM flight 6008 transported the Joint Communications Support Element (JCSE) from McDill AFB to the Indian Springs Auxiliary Airfield. Flight 6008 carried a total of 15 personnel and 12.4 tons of cargo and equipment.

3. MAC SAAMs were used to move exercise players from their home stations to Nellis AFB and Indian Springs Auxiliary Airfield. Unit organic transportation, Nellis AFB vehicles and rental vehicles were used to move players from the staging airfields to the NTS.

4. Two on-call SAAMs were flown and arrived at Nellis AFB on 21 April bringing additional equipment and maintenance personnel from Monterey Airport, CA and Dyess AFB, TX.

5. End-of-exercise missions for NUWAX-79 were flown on 24 and 25 April 1979 returning units and equipment to their home stations.

6. The total NUWAX SAAM data is as follows:

C-130 missions - 3

C-141 missions - 27

Total troops - 480; total tonnage - 356.9 tons

Total airlift cost - $274,256 (does not include the Airlift Control Element (ALCE))

(c) Billeting/Subsistence:

1. The Harvest Eagle Camp provided all player billeting and subsistence support and limited subsistence support to ECS personnel. Confirmed tasking for an Air Force Harvest Eagle package was received by the 820CES in early November 1978. Due to changes in planning factors after that notification, acquisition of items which were not an integral part of Harvest Eagle inventories; e.g., electrical distribution systems, PVC plumbing and lumber, were delayed in being ordered. This potential obstacle was overcome by aggressive supply support from the 820CES, 57TTW, and HQ TAC personnel. Player participation estimates rose in the final days preceding the exercise. This factor, combined with the nonavailability of a minimum number of critical assets (due to concurrent JCS exercises), caused some concern. However, the Camp population never exceeded the support capability of the 820CES.

2. Because NUWAX-79 compressed several weeks of real-world activity into one week for exercise play, it was essential that the Harvest Eagle package be prestaged and operational at the outset of the exercise. In a real-world incident, Harvest Eagle packages could be deployed worldwide to support contingency operations. To establish a tent city capable of supporting approximately 500 personnel, Harvest Eagle activities can assemble resources, deploy and arrive at the accident scene within a matter of days. An additional 5 to 6 days are required to make the camp fully operational.

(d) Medical and Sanitation: Medical emergencies were responded to by DOE in-place resources and USAF-deployed medical activities. The Harvest Eagle Camp provided floored shower and shave tents. DOE provided 40 chemical toilets and 12 dumpsters, including servicing. As previously stated, DOE also provided all anti-contamination clothing, except breathing apparatus, for players.

(e) Munitions: DOE assembled and transported the exercise weapons components from Sandia Laboratories Albuquerque (SLA) and Lawrence Livermore Laboratories (LLL). DOE stored the material in a secure igloo at the NTS until emplacement at the exercise site. A precise grid map was prepared showing the exact location of each classified item at the accident scene. Following a DOE/DOD inventory conducted during the emplacement process, a FCDNA representative signed for the material and assumed responsibility for custody and security; however accountability remained with DOE. While the components were being emplaced, and until security was established by accident response forces, security was provided by USMC guards under the control of the Exercise Director. Once the accountable components were recovered, the items were returned to DOE.

(f) Site Restoration: Initial plans called for removal of the aircraft wreckage from the accident site by Army helicopter following 90-day decay of the Radium-223. Subsequent analysis determined that it was more cost effective to task REECO to remove the wreckage to the NTS salvage yard.

c. Comptroller: Major milestones in pre-exercise planning were as follows:

(1) Although the concept of NUWAX-79 was formulated in June 1976, the financial planning phase was not implemented until October 1976.

(2) The first official reference to NUWAX funding was contained in the Program Objective Management (POM) document for FY 79 which was forwarded to the Office of the Secretary of Defense (OSD) by HQDNA letter of transmittal dated 9 May 1977. In that document, the estimated cost of $1,600,000 was identified as an unfunded item in Operation and Maintenance (O&M) funds.

(3) The initial DNA planning figures for NUWAX-79 were:

Army	$ 50,000
Navy	26,000
Air Force	1,300,000
DNA	109,000
DOE	115,000
	$1,600,000

(4) In a letter to DOE organizations dated 31 March 1977, the Director of Military Applications (DMA) confirmed that DOE support would be funded separately and should not be considered in the DNA budget of $1,600,000.

(5) The FY 79 budget estimate submitted to OSD by HQDNA on 30 September 1977 contained the estimate of $1,600,000 in the O&M portion of the budget.

(6) During the EXPLAN Finalization Conference (28 Feb-2 Mar 78), the budget estimate was revised by the Services to reflect the following redistribution of funds:

Army	$ 31,000
Navy	31,000
Air Force	1,270,000
DNA	268,000
	$1,600,000

(7) On 30 August 1978, messages were sent by the Comptroller, FCDNA, to each Service requesting updated cost estimates for NUWAX-79 participation. The analysis of the revised estimates resulted in the following breakdown of requirements:

Army	$ 36,400
Navy	37,000
Air Force	953,000
HQ DNA	32,000
FCDNA	541,600
	$1,600,000

(8) In FY 79, the NUWAX portion of the O&M Operating Budget was reduced to a funded level of $1,450,000 as a result of a Congressional cut in FY 79 funding. Based on this level of funding, funds were again adjusted, with the concurrence of the Services, to the following levels (Field Command, DNA retained an estimated $620,000 for MAC missions):

Army	$ 49,600
Navy	22,000
Air Force	204,700
MAC Missions	620,000
Field Command	503,700
HQ DNA	50,000
	$1,450,000

(9) Funds were issued to each Service on Military Interdepartmental Purchase Requests (DD Forms 448) for the amounts reflected above. The estimated cost of $620,000 for MAC missions was reserved in Field Command and will be used to reimburse the Air Force Industrial Fund when final costs are billed by HQ MAC. NUWAX funds provided to the Services were for the following:

(a) Army: TDY for helicopter crews, riggers, players, EOD team, umpires, controllers, and pre- and post-exercise meetings; transportation of the Lance warheads; demolition, and helicopter costs.

(b) Navy: TDY for USMC security guards, players, umpires, controllers, pre- and post-exercise meetings, and transportation of target rings.

(c) Air Force: TDY for exercise controllers, umpires, augmentee support, MAC airlift control, MAC DRF, OEHL, Air Staff, contamination disposal team, EOD team, and pre- and post-exercise meetings. Transportation for Harvest Eagle fuel delivery, aircraft wreckage, and disposal transportation cost. Also included were other support costs including: Harvest Eagle construction, generator fuel, nonsubsistence messing supplies, POL, refurbishment of Harvest Eagle equipment, preparation of aircraft wreckage, and miscellaneous equipment rental costs.

(d) Field Command: All funds were retained for TDY, site preparation and restoration, and all other exercise support determined as follows:

1. The initial NUWAX Requirements Worksheets were prepared by the Comptroller Task Group and distributed to each Task Group on 30 January 1979. Weekly changes were submitted by each Task Group and the revised NUWAX Requirements Worksheets were distributed weekly thereafter until 2 March 1979.

2. On 15 and 16 February 1979, representatives from the Comptroller, HQ Commandant, Logis ics, and Operations Task Groups met at DOE, Nevada Operations Office, with representatives from DOE/NVO and DOE/ALO to discuss cost estimates and funding responsibilities for items on the NUWAX Requirements Work Sheets.

(10) In addition to the DOD costs above, DOE estimated costs were ($327,000):

(a) DOE-MA $ 1,000

Overtime for communications center operation and administrative support.

(b)	DOE-San Francisco Operations (including Lawrence Livermore Laboratory) Preparation of contamination (Ra-223), travel, and weapons trainers.	$ 175,000
(c)	DOE-Albuquerque Operations (including Sandia Laboratories and Los Alamos Laboratory) Transportation of weapon trainers, radioactive material, assistance gear, weapons components from Laboratories to the NTS and return, and TDY.	$ 20,000
(d)	DOE-Nevada Operations Miscellaneous exercise support costs	$ 131,000

(11) The total NUWAX-79 estimate is:

Total DOE	$ 327,000
Total DOD	1,450,000
TOTAL NUWAX-79	$ 1,777,000

(12) Actual costs will not be available until final billings are received in all areas (in the July-August 1979 time frame) and will be included in the Post-Exercise Operations Summary to be published in the first quarter of FY 1980.

d. Radiological Safety:

(1) One of the most realistic features of NUWAX-79 was the use of real radioactive material to simulate plutonium (Pu). During the early planning

of NUWAX-79, it was anticipated that Ra-224 would be the radioactive contaminant used in the exercise. However, after a more detailed investigation a decision was made to employ Ra-223. This radionuclide is an alpha emitter, as is Pu, but it is sufficiently short-lived so as not to pose any long-lasting contamination problems and was not expected to cause any health and safety problems. Planners for NUWAX-79 had developed this attitude following their observations of nuclear accident exercises in the United Kingdom. In those exercises, unprotected umpires and observers intermingled with players who were fully suited in response to a (simulated) Pu accident, but all personnel were monitored on exiting the controlled area of exercise play to prevent the spread of contamination. To facilitate operations, an administrative hot line was established separate from the player hot line.

(2) Because Ra-223 was considered a safe contaminant for exercise play, the NUWAX-79 EXPLAN is very brief regarding radiological safety. All guidance is contained within Annex I. Most of this guidance is based on DOE requirements which are specified for activities at the NTS. For example, all personnel entering the NTS are required to wear film badges, and this requirement was obligatory on NUWAX-79 participants. Reference was made to a radiological monitoring program to be controlled by the On-Scene Commander, but it is not clear whether the program was to be geared toward Ra-333 protection or weapons-grade Pu protection.

(3) During a status briefing on NUWAX-79 for the Director, DNA, in October 1978, the Director requested a thorough radiological hazards analysis of the use of Ra-223. (See Section 7d.)

(4) On 3 January 1979, action was initiated to develop a thorough radiological safety plan. The plan was to contain guidance for ensuring that all radiation exposures were as low as reasonably achievable. Although Ra-223

was still considered a safe contaminant, a Radiological Safety Plan was considered necessary in view of general concerns for low-level radiation. The requirement was also motivated as a result of DNA participation in the Nuclear Testing Program Review (NTPR) which evolved from concerns over personnel exposures to radiation during Operation Smokey (an atmospheric nuclear weapons test in 1958), and the Enewetak Cleanup which was being conducted with an extremely conservative respect for low-level exposure to ionizing radiation. (Enewetak was the site of U.S. nuclear weapons tests from 1948-1958.)

(5) The guidance needed in the Radiological Safety Plan was undecided and changed on a daily basis. The need for a Radiation Safety Working Group (RSWG) became apparent. This group was established with representatives from various DOD/DOE organizations. The RSWG first met on 15 January 1979 at the NUWAX Exercise Control Staff Conference.

(6) Initial dose estimates were provided to the RSWG by LLL from information developed for the Radiological Safety Evaluation Report. The initial estimates confirmed the UK assumptions that all exposures should be well below permissible limits. NTS meterological data indicated that winds during exercise play could blow from the south and at speeds which would be higher than at any other time of the year. The wind data posed unexpected problems because the direction was contrary to planning assumptions which had contamination patterns directed toward the southeast. Contaminant patterns were fixed as a result of placing the crash site east of the access highway; thus, provisions had to be made for advising players that the time-of-accident winds were not as they actually existed. The wind direction could be toward the visitor viewing station and planned site for the administrative hot line. If Ra-223 were significantly resuspended, in contrast to initial estimates, then visitors might be denied their vantage point at the designated time on Visitors Day.

(7) The RSWG devoted most of 2 days to discussing philosophy of radiation safety and key points for the Radiological Safety Plan. This involved considerable interchange of views on the necessary and proper response to radiation hazards of Ra-223 versus what was regarded as the "political" response which argued for demonstrated assurance that zero radiological hazard would be associated with use of Ra-223. A key premise developed for the Radiological Safety Plan was that players must respond to contamination as if it were Pu. A second premise was that nonplayers must follow the same guidelines for protection as the players. The philosophy was that if protective clothing is used it shall be used properly. All anti-contamination suits would be taped. Nonplayers' dress and behavior would be similar to that of players.

(8) To minimize interference in exercise play, an administrative hot line would be established as the sole entry/exit point for nonplayers. Although it would be out of the way of players, it was, with one exception, to be operated exactly as a "Pu" hot line. The location would be fixed even if it meant that it was located downwind. The initial dose estimates indicated a downwind location was acceptable. A location near the visitors station would also allow visitors to observe a hot line.

(9) To provide documentary evidence that the contaminant did not migrate or become resuspended to any significant extent, the Radiological Safety Plan was to include provisions for environmental monitoring before, during and after the exercise. Air samplers were to be placed around the 350-meter by 350-meter site which contained crash debris, as well as at the Harvest Eagle site and at the visitors viewing station. These samplers would be operated prior to spreading contaminant to provide background data, and then throughout the exercise. In view of uncertain purity of the Ra-223 at the time, pre- and

post-exercise surveys were required to assure that the site would be returned as nearly as possible to its original condition. These surveys were to consist of an aerial radiation survey and a ground survey consisting of both radiation monitoring and soil samples at about six locations.

(10) Considerable attention focused on requirements for a bioassay program. Ra-223 is an alpha emitter which poses a hazard when ingested by the body. The opinion of the RSWG (later confirmed in the Radiological Safety Evaluation Report) was that no pathway would exist whereby hazardous levels would enter the body, therefore the RSWG recommended against routine bioassay. Bioassays were deemed necessary only if evidence indicated protective systems; e.g. respirators and protective clothing, had failed. Bioassay, thus, was expected to be performed as an exception rather than as routine. The specific method to be employed; e.g., urine sample with gross alpha or specific Ra-223 fecal analysis, or whole body count, was to be determined. Additional investigation of Ra-223 chemical and nuclear properties was needed, as well as REECO capabilities, before a preferred bioassay could be specified.

(11) Some concern was raised that players criteria for release of Pu-contaminated equipment for uncontrolled use are not as stringent as criteria in use at the NTS. However, the NTS criteria for Ra-223 are less stringent than player criteria for Pu. Thus, if players were held to the Pu criteria, then all equipment released from the controlled area should be in compliance with the NTS criteria.

(12) The RSWG then drafted a text incorporating viewpoints which had been agreed upon. The draft was reviewed and left with FCDNA for revising into EXPLAN format, following completion of the LLL hazards analysis.

(13) During discussions on the last day of the Exercise Control Staff Conference, a topic was whether or not two nonplayer access roads should be constructed -- one leading to the crash site north side and the other to the south; or some combination such as a spur road leading off the north road. The RSWG maintained that hazards were so minimal that unprotected persons might stand downwind at the visitor station and not receive any significant exposure even under worst conditions. Thus, a single northern road was recommended.

(14) During one of the earlier planning sessions when the UK concept of an administrative hot line was acknowledged as being beneficial, a request was made for volunteers to man such a hot line. The USA/FORSCOM responded that an Alpha Team from Ft. Bragg would be made available. Initial concepts were that this would be a low key effort. Accordingly, a 5-man team was to report by commercial aircraft to the NTS and carry as much essential clothing and portable monitoring equipment as possible without excess baggage approval. Other support for the hot line was expected to come from Ft. Ord, which was to provide the player hot line. However, as events unfolded, the original Ft. Bragg role increased in scope. Approximately 175 observers, umpires and other nonplayer personnel were expected to use the administrative hot line, perhaps on a daily basis. These operations would be highly visible to visitors due to their position. When the expanded need for a hot line became apparent, Ft. Ord had already committed its available aircraft space and therefore no support equipment could be carried for the Ft. Bragg team. The needed resources were ultimately obtained by borrowing from the Kirtland AFB hospital, the Interservice Nuclear Weapons School, and renting/purchasing from REECO.

(15) Concern was also raised that a 5-man team, as proposed by Ft. Bragg, might not be sufficient in view of the large number of nonplayers who might utilize the administrative hot line. In actuality, the 5-man team proved entirely adequate due to last-minute reductions in number of nonplayers attending NUWAX-79 and a tendency for observers to enter the controlled area only once. (Only seven observers chose to reenter the controlled area after their first entry.)

(16) A requirement was generated to demonstrate that air in the visitor area was uncontaminated. The environmental air samplers were to provide such data. The filters were to be rotated on a 24-hour basis and laboratory analysis was expected to take two days to conduct. Since Visitors Day was scheduled for D+2, there was little time to obtain any baseline data. Thus, in situ monitoring of filter papers on the air samplers was programmed. Preliminary measurements indicated in situ monitoring would be of sufficient sensitivity to determine that Ra-223 concentration in air was well below MPC only if the Ra-223 were soluble; however, sensitivity would be marginal if the Ra-223 source were insoluble. Subsequent experiments conducted at LLL indicated the dispersed contaminant is more insoluble than soluble.

(17) Arrangements were made to transport an Eberline Instrument Corp. Model Alpha-3 air sampler from LASL to the NTS. This unit has an energy discrimination capability and can distinguish Ra-223 alpha radiation when in the presence of natural alpha radiation. The energy discrimination capability allowed [illegible] sensitivity by about a factor of two and provided a [illegible] the other air sampler measurements. The Ft. Bragg Alpha [illegible] air sampler.

(18) The role REECO was to play in NUWAX-79 increased substantially beyond taskings listed in the EXPLAN. One reason was a decision to use the REECO decontamination laundry rather than to have players provide their own laundry service. Although this solved one problem, it created another because the REECO laundry distributes some low-level contamination to all suits which are processed. Thus, concerns were that players might turn in "clean" Anti-C suits to REECO and receive "dirty" suits in exchange. Accordingly, REECO was instructed to issue Anti-C clothing for all players and nonplayers.

(19) Provisions had to be made for acquiring nonplayer respirators and the quantity required was greater than anticipated. The NTS complies with the Occupational Safety and Health Act (OSHA) rules and regulations; thus, provisions had to be made for instructing nonplayers in the proper use of respirators. Since some nonplayers were expected to wear glasses, arrangements were needed for optical inserts and corrective lenses.

(20) DOE/NVO also desired confirmation that player monitors were performing adequately. REECO was tasked to monitor a representative portion of equipment which was released from the controlled area. As the exercise progressed, REECO provided an increasing amount of equipment and manpower. This included monitoring the visitors' bleachers and vicinity on a daily basis, furnishing dust masks, heavy-duty plastic bags for players, collecting soiled Anti-C clothes and contaminated wastes, air samples, etc.

(21) Coordination and approval for REECO support was gained through a series of meetings among personnel of FCDNA, DOE/NVO and REECO. Work orders were initiated at FCDNA, processed thru the FCDNA Test Directorate's Test Construction Division (FCTC) which served as liaison at the NTS, to REECO who provided cost estimates and, finally, to DOE/NVO who gave concurrence.

(22) The LLL published the draft Radiological Safety Evaluation analysis in late February and made a limited distribution for comment to LLL, LASL, FCDNA, DOE/NVO and DOE/ALO. The evaluation was published in early March and supplemented with an errata on March 9. The final evaluation confirmed earlier estimates that NUWAX-79 could be conducted safely using Ra-223.

(23) During a status briefing for Director, DNA in late March, a requirement was established to issue statements to participants advising them of the radiological aspects of NUWAX-79. This statement was prepared at DOE/ALO and coordinated among DOE/NVO, LASL, LLL and DNA. All participants, players and nonplayers, were required to acknowledge receipt of this statement by signing a duplicate copy which is being retained in FCDNA files. When practical, the statement was reinforced by a verbal presentation of the information.

(24) NUWAX-79 was to receive thorough coverage by a photographic team. A problem was encountered in that camera coverage would be handicapped if full-face respirators were required. Since half-face negative-pressure respirators are not acceptable for protection against Pu, and nonplayers were also required to be provided protection to that level, the problem was resolved by using two powered-air, positive pressure half-face respirators. These provided cameramen with a good field of view and provided more protection than players achieve with M17 masks. Through an oversight, however, no backup batteries were obtained. Rechargeable batteries with a daily operational capability of 6 hours were used. Thus, several days were cut short due to loss of power. The powered air respirators provided a solution also in

one instance where an observer had a full beard. No adequate seal was possible with the full-face respirator, but the powered air with full face mask was sufficient to pass the qualitative respiratory test which had been established. Due to manufacturing deficiencies, many lenses obtained for observers would not fit the holders. The powered-air, half-mask respirators could also have served in instances like this had they been available in greater quantity.

(25) The NUWAX-79 Radiological Safety Plan was finalized on April 4. It consisted of the basic plan as developed by the RSWG and appendices including the Safety Evaluation report, the Statement of Radiological Aspects, the Radioactive Contamination Plan, and administrative forms which were to be used. Later, an annex on bioassay was added. This requirement was originated at DOE/NVO when final consideration was being given to conduct NUWAX-79 at the NTS. The DOE/NVO determined that a records system would be inadequate if no bioassay data were obtained on a routine basis. This was not to doubt the safety evaluation, but to provide the negative data which currently plays such an important role in radiation safety. Urinanalysis was selected as the appropriate bioassay. It was determined that a single void sample on last exit from the controlled area with analysis for gross beta following a radium chemical separation would be acceptable.

(26) The administrative hot line was operated at the 350-meter northern boundary of the crash site. A general purpose tent was erected on the clean side of the line. This tent was used by the administrative personnel managing the bioassay program and controlling area entry/exit logs. A mobile 350-gallon personnel decontamination shower was placed at the hot line. The tent was

backed up by a REECO semitrailer facility for storing Anti-C suits, radiation detectors, plastic bags, tape, etc. and a step van which was used to issue respirators, conduct qualitative fit checks, and install lenses in lens holders.

(27) ECS personnel were stationed at both player and nonplayer hot lines to manage the bioassay program and control area logs. Bioassay samples were assembled at the semitrailer facility at close of day and picked up by REECO early each morning for forwarding to the laboratory for analysis. A list was prepared each evening of persons who submitted samples and persons who owed samples. The system worked effectively and only six persons left the site without submitting samples (they subsequently have submitted the required sample.)

e. Administration:

(1) The January 1979 NUWAX Conference was the first occasion for selected Headquarters Commandant Task Force personnel to become involved with NUWAX planning. The conference served as an orientation as opposed to a coordination vehicle though it did allow for establishment of future contacts and a means of coordination. As a result of this conference, the Headquarters Commandant Organization was established to include the following: Administration, Comptroller, Communications, Security, Radiation Safety, Logistics, and Visitor/Observer Protocol. While these elements were placed under the Headquarters Commandant, this section will only address the administrative planning functions. The other areas are addressed separately in this report.

(2) During the final week of January, the administrative responsibilities were defined in five areas as follows:

(a) Preparation of the administrative work site; i.e., the A&E building to be used at Mercury.

(b) Preparation of the housekeeping/billeting, messing and recreation for the ECS.

(c) Movement of personnel to and from the exercise site which included a detailed movement plan from Albuquerque to Las Vegas and the NTS. The other control staff personnel would move as per their own planning.

(d) Maintenance of a morning report of attendees at the exercise site. This requirement developed in the early planning stage; however, it was not implemented until the exercise began.

(e) Determine and provide the on-site ECS transportation requirements; vehicles to come from the existing DOD/DOE vehicle fleets at the NTS.

(3) February was primarily spent in coordinating and developing the requirements stated above. Additionally, the equipment and supply list was developed and coordinated with the Logistics element. The A&E building was reevaluated and a decision was made in early March 1979 not to utilize the third floor. This decision could have had a major impact on the communications because of the antennas going through the roof and the installation of the telephone system. The time of the decision was such that it did not have an adverse impact in these areas.

(4) March was the month for final revisions of all of the basic Headquarters Commandant responsibilities. The floor plan was approved and the Bill of Materials finalized in support of the floor plan. The telephone directory based on the floor plan was developed. One of the major areas of concern was the refinement of the billeting requirements. The requirements were contingent upon the list of personnel who would attend the exercise.

This list was subject to daily changes making a firm billeting plan difficult; however, the total number of billets required daily was provided to the NTS Billeting Officer allowing him to make block reservations. Billets that he made available included 5 dormitory buildings, 10 trailers, and 22 rooms in concrete block houses which were to be given to personnel in the grades of 06 and above. ECS on-site transportation requirements were satisfied by assigning specific vehicles from the DOD/DOE NTS fleets to specific ECS functional areas. A Vehicle Control Officer (VCO) program was initiated using three VCOs - visitor/observer, umpires, others. The March 1979 conference was used to announce the planning that had been conducted up to date and also announce the movement plan for the main body from Albuquerque to the NTS. The plan called for two checkpoints to be established. One was the Nevada Operations Office in Las Vegas where badges and initial briefings would be conducted and, secondly, the Mercury Chapel where billeting keys and vehicle keys were issued to the control staff. Also during this conference, work order coordination was performed to continue the preparation of the Mercury facilities.

(5) In April, a welcome packet was developed and printed. TDY orders were processed and plane tickets acquired for all Field Command personnel traveling by commercial air. The welcome packet was detailed and contained all of the necessary administrative information required by control staff personnel as they arrived at Mercury. Items included were the activities schedule for all facilities at Mercury, the bus schedule between Mercury and the A&E building, work hours, a safety packet and general government rules for Mercury. This welcome packet served as the implementation of the movement plan as well as the itinerary package for the ECS and ESG for pre-D-day activities.

f. Communications - The Chief, Communications Electronics Officer (FCDNA/FCE) was responsible for planning, coordinating, and executing the communications operations for the ECS. The following pre-exercise planning was accomplished:

(1) October 1978 - During the NUWAX-79 planning conference in October 1978 at DOE/NVO, an initial site survey of the proposed exercise area was made. DOE/NVO took the lead in specifying ECS Communications-Electronics (C-E) requirements and limitations which were:

(a) DOE/NVO would provide an EG&G communications pod with two VHF/FM handi-talkie radio nets and 80 radios, two slow-scan TV circuits, and radio/wire integration for exercise control.

(b) A maximum of eleven telephone trunks between the NRDS Private Automatic Branch Exchange (PABX) and the Camp Mercury PABX would be available along with eight phone lines (four for umpires and four for controllers) that could be installed in the A&E building.

(c) Abandoned cable down range to the exercise site was unserviceable. Nevada Bell construction costs to provide cable to Harvest Eagle would require at least 90 days lead time and cost approximately $30,000.

(d) Camp Mercury communications center could provide over-the-counter message service.

(e) Players would be required to submit their list of C-E equipment and operating frequencies for frequency clearance on the NTS.

(f) FCDNA/FCE would prepare a C-E Operating Instruction for the ECS.

(2) Player planned C-E equipment deployments were received during November-December 1978 and it was noted that long haul capabilities as well as secure record and voice communications were limited. It was also

determined that total reliance on radio for down-range ECS communications was not prudent. Furthermore, some landline capability for safety/emergency purposes was required.

(3) To aid in planning, supporting and coordinating the C-E support requirements of DOE and DOD, a 1960 CS Operations Order NUWAX-79 was written and published in February 1979. It proved to be of tremendous value in bringing C-E requirements into focus. Without it, the final days of pre-exercise activity would have been extremely difficult. ECS communications support alternatives included the following:

1. Utilize an Air National Guard/Air Force Reserve communications flight.

2. Call out a mobile communications unit.

3. Utilize 1960 CS personnel and DOE assets.

(a) Much thought was given to each of these alternatives. The final decision to utilize the 1960 CS for this support was based on the following factors:

1. As the exercise plan developed and became more detailed, the need for more complex and expanded communications support forced the need for tight control and close coordination with the supporting communications element. It was determined that this could be best accomplished through the Communications Electronics Staff Officer (CESO) and the Commander, 1960 CS.

2. The FCDNA C-E Officer (1960 CS/CC) would have direct management control over the personnel, systems, and assets deployed. The major areas of ECS communications support were record communications, voice communications, and VHF radio communications.

3. Initial consideration for this support was to utilize the existing telecommunications facilities at Camp Mercury. The adequacy of this support was less than desirable due to the following reasons:

aa. The Camp Mercury facility only operated 8 hours/day 5 days/week.

bb. The operation was limited because they entered the AUTODIN system through DOE Germantown which was also only a part-time station.

cc. Message traffic would have to be transported from the Camp Mercury Communications Center to the A&E building, NRDS, Nevada. This trip required 30 minutes one way.

dd. The Nellis AFB Communications Center would have been designated alternate route for message traffic. The distance from Nellis AFB to the A&E building, NRDS, NV was approximately 60 miles.

ee. Consideration was also given to using a mobile/transportable communications center. However, with an AUTODIN Mode V terminal, a leased circuit would have been required. KW-7 secure equipment could not be interfaced directly to an AUTODIN switch because of lack of compatible equipment at the switches. As a result of these factors, the decision was made to establish a secure pony circuit between the Kirtland AFB Telecommunications Center (TCC) and A&E building, NRDS using DOE-provided equipment. These terminals would then be operated by 1960 CS personnel at both ends. The M-37 teletype machines for this pony circuit configuration were provided by DOE. All machines required extensive maintenance and two temporary duty (TDY) teletypewriter (TTY) maintenance personnel were called in to support this effort. Interface equipment, originally to be provided by DOE, had to be obtained from the Air Force COMSEC Depot. Acoustic couples were provided by Sandia Laboratories. Other planning factors included:

i. Reactivating the secure communications vault in the building.

ii. Modifying the UNIVAC DCT 9000 computer at Kirtland Air Force Base to provide a paper tape output when the routing indicator for ECS traffic (RUWTKRT) was used.

iii. Establishing telephone circuits for TTY transmissions between the KAFB TCC and the A&E building, NRDS.

iv. Identifying personnel support requirements for a 24-hour operation at the exercise site.

v. Obtaining manning support from the Naval and Air Force reserve units in the local area to work in the base Telecommunications Center and the Administrative switchboard.

4. Planning in the voice communications area was much simpler since Nevada Bell already had telephone lines into NRDS. Coordination was required to expand the NRDS to Camp Mercury trunk capacity from 11 to 23. Each of the lines in the A&E building had direct access to FTS and commercial service with the Kirtland AFB Administrative switchboard providing access to AUTOVON and WATS. The following major planning actions were accomplished:

aa. Requisitioned telephone instruments and cable for the ECS key systems in the A&E building. The 1960 CS telephone personnel installed all the telephone key systems and provided the necessary equipment. This resulted in a savings of approximately $7,000 which Nevada Bell would have charged for the same work.

bb. Requisitioned fieldwire to extend telephone service to the Red Horse group and hot line service to the On-Scene Commander and the security personnel. This action was also accomplished by 1960 CS personnel.

cc. Prepared telephone plans including number assignments, intercom stations, and hot-line arrangements.

dd. Designated a special operator access code for official NUWAX calls through Kirtland AFB.

ee. Coordinated public address system requirements. This was initially designated as a Nellis AFB support item but was later given to REECO (a contractor). This was necessary due to the daily requirement for public address system support.

ff. Augmented Kirtland AFB switchboard operator personnel to support increased demand during normally slow call traffic periods.

gg. Developed calling procedures from and to the ECS (A&E building, NRDS) through the Kirtland AFB switchboard.

5. The entire radio communications system and assets were planned and scheduled to be supported by DOE/NVO. They were to provide a dual net repeater base station along with 100 portable radios. Two weeks before the exercise, their entire system was sent to the nuclear accident at Three Mile Island near Harrisburg, Pennsylvania. The 1960 CS then installed two base stations and provided portable radios for two independent radio nets. A third net was provided using the NTS net 7 base station and portable radio assets. The following major planning factors were accomplished:

aa. Identified location for base station and antenna.

bb. Obtained approval to use established DOE frequencies during exercise.

cc. Established radio net procedures and discipline for ECS staff.

(4) A detailed Communications-Electronics Operating Instructions (CEOI) was prepared and published covering record, voice, and VHF radio communications procedures. This CEOI was distributed to all ECS members, each Service's player headquarters and DOE. It proved to be extremely valuable and useful in providing efficient and reliable communications.

(5) Frequency coordination for the players ran into the following difficulties:

(a) It was initially understood that the Area Frequency Coordinator at Nellis AFB would take care of this action. It was later learned that he only coordinated on the proposed player frequencies at the NTS.

(b) Some of the player frequency personnel were opposed to FCDNA/FCE being involved in this coordination process. They felt it was totally their responsibility to accomplish this action. FCDNA/FCD was directed by the Exercise Chief of Staff to effect this coordination.

(c) Frequency identifications made by the players were not correct in all cases. The Kirtland AFB Frequency Manager from the 1960 CS had to resolve many frequency problems.

g. Safety.

(1) Safety planning for NUWAX-79 was divided into two areas - Radiological Safety and General Safety. The former usually is under the responsibility of a military surgeon - the latter under a unit commander and includes all areas under the OSHA. The FCDNA Safety Office was not actively involved in the planning of NUWAX-79 until January 1979. In future exercises, safety involvement should begin earlier.

(2) Because of a unique situation in the DNA, the DNA surgeon has the position of designated OSHA official for the agency. This resulted in his being appointed as overall exercise safety officer with monitoring in medical support, also. Thus, the senior medical advisor to the Exercise Director was also his safety advisor and resulted in an efficient chain of command and control of all medical-safety aspects of this exercise in the field.

(3) With the need for a stronger environmental health program, a bio-environmental engineer, who was assigned as an umpire, was tasked to develop an environmental health program for a field operation. This was accomplished before D-day and resulted in a new organizational plan. The DOE designated a safety counterpart for local support and assistance.

(4) The Director, Office of Safety and Health, DOE/NVO, who maintained overall safety responsibility for the NTS and for the exercise, designated a safety representative to be on the staff of the Exercise Control Group and established a liaison channel with the Exercise Director in order to be assured that NUWAX-79 activities were conducted in a manner consistent with the overall safety and health policy established for the NTS.

(5) Also, each organization at the NTS retained unit responsibility for the safety of its operations and for the safety and health of its personnel. Thus, for the purposes of NUWAX-79, the Exercise Director (Commander, FCDNA) was designated by the Manager, DOE/NVO to be responsible for the safety and health of NUWAX personnel and participants within the boundaries of the NUWAX exercise area and other locations at the NTS dedicated to NUWAX operations.

(6) Daily safety rounds of all exercise assets delegated by NVO to the Exercise Director were accomplished by the DOE and exercise OSHA officers for purposes of review and monitoring. Daily safety analyses were presented to the exercise safety officer and, thru the Exercise Director, to the On-Scene Commander.

(7) Two environmental safety bulletins on snake bite and heat stress were issued to all exercise participants. Other environmental health areas such as water purity; food preparation and storage; sanitation, insect, rodent, and zoonosis control were left to the support services of the On-Scene

Commander, but reviewed by the exercise environmental health officer as an additional duty over and above his responsibilities as an exercise umpire.

(8) The DOE Health Physics umpire at the player hot line was given the additional duties of safety monitoring for the personnel in cordon and at the hot line with daily debriefings to the Safety Officer. Exercise staff safety monitoring was assigned to Radiological Safety personnel assigned to the administrative hot line.

(9) No major problems occurred during the exercise; however, the following incidents occurred. One USMC guard was struck by a rattlesnake, but his boot was not punctured. A small fire occurred in the wall of the kitchen tent (see safety report, 22 April 1979). One USAF security policeman fell from a moving vehicle and injured his hip but lost no duty time (see safety report, 23 April 1979).

(10) Conducting an exercise of this magnitude safely under field conditions requires rigorous attention to detail and constant supervision and monitoring. Safety responsibilities must be assigned to a senior officer with direct access to the Exercise Director. These responsibilities can be easily shared by a surgeon and a safety officer.

h. Public Affairs.

(1) Public Affairs (PA) planning began in the summer of 1978. A draft PA plan was prepared by the DNA PAO and submitted to ASD(PA), Service Public Affairs Offices, FCDNA, DOE/MA, DOE/NVO, and ATSD(AE) for comment. Based upon comments received and discussions at NUWAX-79 planning meetings, the PA plan was submitted on 2 January 1979. The plan addressed both real world and exercise public affairs matters. It was decided that real world news media

coverage support would be low-keyed and based at the DOE Las Vegas office. A press visit on D+2 was planned for those who requested a visit to the site. The press announcement was planned to be sent out by the DOE/NVO PAO to their standard press mailing list on D-4. A joint DOD/DOE press center at DOE/NVO was planned as an austere, business-as-usual operation to respond to media requests. Questions and answers were developed and after staff review were included with the Public Affairs Plan. The Director, DNA met with the ASD(PA) and ATSD(AE) in January 1979 to discuss the suggested approach to NUWAX-79 press relations and plans were reviewed by DOE's Office of Public Affairs (DOE/OPA) headquarters in Washington. The exercise public affairs play was developed at the week-long planning meeting at Kirtland AFB in January 1979. An experienced public affairs officer with Washington-level experience, an Air Force lieutenant colonel, was brought on board to serve as the controller/umpire/evaluator during the exercise. An Army reserve officer with extensive public affairs experience was brought on active duty for 2 weeks to assist in the control and evaluation of exercise public affairs play. The DOE also arranged for experienced personnel to participate as simulated newsmen.

(a) The Joint Press Center was scheduled for opening on D-2 at DOE/NVO in Las Vegas to deal with the press. On D-3, a meeting was held at the Exercise Headquarters by the Exercise Director and his key staff members to discuss the finalized questions and answers which would serve as the basis for response by all who would deal with the real world media.

(b) Preparation during D-4 to D-2 included attendance at umpires' organizational meetings and visits to the accident site and Harvest Eagle.

The key event on D-2 was a meeting with actors provided by REECO. This meeting was a real eye opener in terms of the talent and capability (video tape) available to the Public Affairs Umpire/Controller. A second meeting at DOE/NVO on D-1 was attended by REECO representatives and public affairs personnel from DOE facilities. The latter played news media representatives during press play. Since this was a multi-source responsibility; i.e., some REECO personnel, some military personnel located at Camp Mercury and DOE personnel billeted in Las Vegas, establishing a firm schedule of when and where actors should report was essential. The driving distances involved and phones available to the umpire made last-minute changes to the schedule difficult to accomplish. At the meeting, ground rules for handling of real world press were discussed (press briefing at 1430 on D-day and media visit on D+2). The ground rules were that the DNA PAO and DOE/NVO PAO would handle all real world public affairs activities. In the event that neither were available, it was agreed that the umpire/controller would handle public affairs matters for the Exercise Director.

(2) News media interest in NUWAX-79 actually began in September 1978 with a story in the Washington Post based upon congressional testimony by DNA requesting funds for NUWAX-79. There were a few follow-up stories in September 1978 but nothing major until late March 1979 when a series of queries from several reporters from around the country were received at HQ DNA and DOE/NVO. Stories appeared in such national outlets as the Christian Science Monitor, UPI, and the Baltimore Sun in late March and early April. The Las Vegas local newspaper also carried NUWAX stories at that time. Two unforeseen occurrences, the movie "China Syndrome" and the nuclear reactor accident at the Three Mile Island nuclear power plant near Harrisburg, PA brought much more media interest in NUWAX-79 than had been expected. The national TV networks, UPI, Newsweek,

the wire services and many newspapers asked what arrangements were made to permit coverage of the exercise 2-3 weeks before the planned press announcement date of 15 April. The media were advised in the 15 April press announcement that a press visit was scheduled on 20 April, D+2. Furthermore, in response to many requests for information, a press briefing was scheduled on D-day and arrangements were made to cover the arrival of the players at Nellis AFB on D+1. In response to requests from the national TV networks, a DOE contractor took motion and still photography of the exercise site for inclosure in the press packet and film coverage of the exercise activity on D-day and D+1. The latter film was provided the evening of D+1.

(3) NUWAX-79 was a major news story. It received extensive coverage nationally and locally. The three TV networks ran stories on NUWAX; NBC on the 19 April "Today Show" and on the "News Tonight" show on 20 April; CBS on the "Morning News" show on 20 April. The AP radio network ran several stories throughout the exercise. The Las Vegas AP and UPI bureaus filed several stories on their national wires throughout the exercise which were used by newspapers around the country. Newsweek, Stern, and Life magazine all covered the exercise with photographs. The local Las Vegas media, TV, radio, and newspaper all gave extensive coverage to the exercise. The stories were generally accurate, favorable in tone, and noncritical.

i. Legal.

(1) Legal planning began in the fall of 1978. A draft legal plan was prepared by the DNA General Counsel (DNAGC) and submitted to FCDNA for comment. Based on the comments received, the Legal Plan was submitted late December 1978. The plan addressed both the real world and exercise legal matters. It was determined that in order to prepare for the possibility of real world legal problems, contacts should be made with various state and federal agencies with

jurisdiction at the NTS. DNAGC established contact points with the Chief Counsel, DOE/NVO, the U.S. Attorney for southern Nevada, the Nye County Sheriff and other concerned organizations. The exercise legal play was developed at the week-long planning meeting at Kirtland AFB in January 1979. An experienced Judge Advocate General (JAG) officer with Washington-level experience, an Air Force Major, was brought on board to serve as umpire/evaluator for the exercise. An Army reserve officer with extensive JAG experience was brought on active duty for 2 weeks to assist in the control and evaluation of exercise legal play. Both officers also provided real world legal assistance to the DNAGC and the ECS.

(2) On D-1, rumors indicated that a Las Vegas, NV based environmental group known as the Sage Brush Alliance were planning to ask the Federal District Court for southern Nevada for a temporary Restraining Order and a preliminary injunction stopping the DNA from spreading the contaminant. The DNAGC contacted the U.S. Attorney's office and it was agreed that if such action took place, an immediate hearing would be requested. The rumor was unfounded. Peaceful protestors did appear at the DOE headquarters on D-day.

j. Visitor/Observer: The objective of the visitor/observer program was to provide official visitors and observers with the opportunity to witness the exercise, and achieve adequate orientation while minimizing player interference. Major milestones for the visitor/observer program are identified and summarized below.

(1) Organization: Initial planning for visitors/observers was initiated in the fall of 1978. The visitor/observer task force organization was initially established in February 1979 with a four-man working group which planned, organized, directed and coordinated the visitor/observer program. This included monitoring visitor/observer nominations, preparing formal visitor invitation

letters and information packets, developing itineraries, lesson plans and scripts, implementing instructions and coordinating logistical support requirements. The organization also included a point of contact at HQDNA for coordinating initial planning for United Kingdom participation in the observer program. Also, an instructor group from the INWS was included to develop and provide presentations, displays, and demonstrations for the visitor/observer program. Prior to developing detailed plans, initial and follow-on visits to the DOE/NVO, NTS and the exercise site were performed by the working group and the INWS. This served to familiarize the group concerning routes of travel, driving times, and exercise layout, and was essential in formulating the concept of operations for receiving, badging, transporting, briefing and handling visitors and observers attending the exercise. Upon completion of detailed plans, and as the number of visitors and observers developed, the organization was augmented with a 14-man escort group and two secretarial assistants. Escorts were briefed on detailed plans and duties were assigned.

(2) Complete Name List: The visitor/observer program was designed so that it would not interfere with exercise activities. To minimize exercise interference and for logistical reasons, quotas of 210 and 138 were set for visitors and observers, respectively. Service/Agency quotas were distributed according to participation in the exercise. Requests for visitor/observer nominations were forwarded to the Services, DOD agencies, federal, state officials, and the DOE early in the planning phase. Nominations of observers and visitors remained very fluid and substitutions, additions, and deletions continued until D-day. The majority of observer nominations were received by the end of February and all observers nominated were accepted. Formal invitation letters and invitation packets for visitors were dispatched by 20 March.

Visitor response forms continued to be received until 6 April. On D-day, 18 April, invitations had been extended to 101 visitors. Of these, 63 indicated they would attend the visitors day program. Also, 99 observers had been nominated, all of which were expected to attend the exercise beginning on D-day.

(3) Protocol: The Protocol Plan for the visitor/observer program was applicable to VIP visitors only. These visitors were identified early in the planning phase and consisted of military personnel of three-star rank and above and civilian equivalent from the DOD, DOE, DOE laboratories, the Nevada Governor's office, and the Nevada Congressional Delegation. Execution of the Protocol Plan required senior military personnel to act as sponsor-escorts for all VIPs. Sponsor-escort duties included making initial contact with assigned VIPs and arranging for their transportation and overnight accommodations.

(4) Logistics: Logistics support for the visitor/observer program was arranged for by the ECS. Major requirements existed in the areas of protective clothing, messing, display boards, public address systems, transportation, and bleachers. Due to lead time required, requirements were developed early in the planning phase and were based on initial quotas established for visitors and observers. As attendance figures developed, logistics requirements (especially transportation) were reduced from initial estimates. All logistic requirements were completed by 1 April. Of all the support requirements, the bleachers became the principal area of concern. Essentially, a requirement existed for bleachers which would accommodate 200 visitors, satisfy safety standards, and be elevated to allow adequate observation of the exercise site. Alternatives considered to satisfy the requirements included constructing bleachers on flat-bed trucks, mounting bleachers from nearby military installations on flat-bed trucks, or contracting the requirement to a commercial firm. Ultimately,

the economic and practical considerations dictated that the requirement be given to a commercial firm specializing in this type of service.

k. Documentation: The mission of the documentation program was to provide a historical record of the exercise to include: film products, exercise plans, orders and operating procedures, maps, after-action report, radiological records, and news media reports. A project officer for documentation of the exercise was assigned in June of 1978. The basic decisions concerning documentation had been made in the planning cycle and were contained in the Joint DOD/DOE EXPLAN NUWAX-79. Change 1 to the EXPLAN of 12 February 1979 modified and expanded the documentation program to fulfill the requirements that had been developed. The U.S. Army Special Operations Pictorial Detachment, Ft. Gillem, GA, and Los Alamos Scientific Laboratory (LASL) provided still photography and sound cinema documentation of the exercise. The documentary film is provided by LASL and will be distributed on or about 1 December 1979. Other film products will be distributed in accordance with Annex K to Joint DOD/DOE EXPLAN NUWAX-79. Other documentation requirements are explained in detail in that Annex. A permanent file of the nuclear weapons accident exercise has been established at FCDNA and contains complete information on the development, planning, and execution of NUWAX-79 as well as the radiological records of the exercise.

l. Security (FCDNA)

(1) The FCDNA Security Officer was appointed as Security Officer to the FCDNA Working Group for NUWAX-79 on 9 November 1978. The first meeting was held in early December. At that meeting, basic requirements were discussed and working group members were briefed on the background and concept of NUWAX-79.

(2) Certain basic decisions had been made prior to a security officer being assigned to the working group. Decisions had been made to hold the exercise on the NTS, use classified components (Secret Restricted Data/Critical Nuclear Weapons Design Information (CNWDI)), spread a live contaminant, and use Marines to aid in security of the accident site. Two of these decisions: (1) use of the NTS and (2) the use of classified items determined many of the actions taken in the planning phase.

(3) Work started in earnest after the first of the year (1979). Preparations for the Exercise Control Staff Conference, held on 15-19 January 1979, filled the first two weeks of January. The Security Working Group members were formalized. The group went into the conference with the following objectives and tasks outlined:

GENERAL OBJECTIVES

(a) Finalize NUWAX-79 Security Implementing Instructions.

(b) Agree on Marine duties and responsibilities. Prepare a detailed instruction covering the Marine security force.

(c) Develop an understanding of the importance of clear legal guidelines for Director, ECS. Assign responsibilities and tasks.

(d) Develop schedule for accomplishment of all security tasks.

SPECIFIC TASKS

(a) Develop a badging procedure for exercise players.

(b) Define types of legal guidelines needed by the Director, ECS. Set hard deadlines for answers.

(c) Assign responsibility and deadline to provide lighting of accident site.

(d) Finalize measures needed to protect classified items before and during the exercise. (To be incorporated in instructions.)

(e) Finalize increased security measures for press. Set up firm liaison between security and publicity personnel.

(f) Determine requirements for Air Force Security Police manning at Gate 510.

(g) Establish liaison with Nellis AFB project officer for negotiations with Nellis Security Police.

(h) Agree on Marine communication requirements and place order for same.

(i) Develop policy concerning the need for law enforcement at the Harvest Eagle tent city.

Each of these areas was worked during the conference. Implementing instructions were finalized except for minor details. One area of some concern was the legal jurisdictional problems created by using the NTS for the accident site. Civil jurisdiction was yielded to the Nye County Sheriff. This complicated the design of protection and security procedures. Put simply, the military had no legal standing for their role of security of the site and classified items. If the Exercise Director had been confronted with a violent demonstration or overt espionage, this problem could have been crucial. An understanding was reached that the HQ DNA General Counsel would develop legal guidelines to be used by the Exercise Director throughout the exercise. A liaison visit by the Security Officer to Las Vegas, NV, identified the action agencies and accomplished all of the specific tasks except assignment of Harvest Eagle law enforcement responsibilities. Later, the Exercise Director assigned law enforcement responsibilities in the Harvest Eagle camp to the On-Scene Commander. The lighting of the accident site was assigned to REECO. DOE/NVO identified the need to erect a temporary gate, called 510T, between the

A&E building and the accident site to control entry into other parts of the NTS.

(4) Gate 510, near Lathrop Wells, NV, was to be manned by a security policeman from Nellis AFB, NV.

(5) The need to cover the classified items in the field was identified because they were sight-classified. USA Intelligence and Security CMD, CI Det., DNA was tasked to develop plans to thwart overhead surveillance.

(6) The twenty-member Marine security force was formally requested by message to the Commandant of the Marine Corps on 1 February 1979. Confirmation and acceptance of Marine participation was received on 23 February 1979.

(7) The largest problem identified at the conference was the need for those entering the accident scene to have a CNWDI clearance because of the CNWDI classification of the training items used in the simulation of the crash site. Their answer was received on 12 February. The Commander, Field Command was authorized to grant clearance and access to the players attending the exercise if they possessed a Secret or Top Secret clearance. Observers and staff members attending the exercise and needing CNWDI clearance would be certified by their own command in accordance with (IAW) existing directives. Specific guidance was given to these personnel in early February to enable them to follow the proper guidelines in obtaining CNWDI clearance.

(8) Logistics requirements were identified early in February.

(9) Identification cards were designed and ordered printed through the FCDNA plant. Six categories were identified and each was given its own day glow color code:

(a) Umpires - Orange

(b) Controllers - Red

(c) Visitors - Yellow

(d) Observers - Green

(e) Staff - Red on white

(f) Media - Black on white

(10) Enough yellow nylon rope was ordered to cordon the 350- by 350-meter square comprising the accident site. A conex container was used to store weapons and high value items for the Marines in Harvest Eagle. REECO supplied four flood light units, each with four independently adjustable lights. This proved sufficient to light the entire accident site. A trailer was placed at Gate 510 for use by badging and Radiological Safety (RADSAFE) personnel.

(11) In order to assist the Exercise Director during a civil disorder or terrorist threat, a Civil Disobedience Response Scenario was published 3 March 1979. It was modified slightly in April to account for changes in Gate 510 procedures.

(12) Gate 510 was initially to be manned by Air Force Security Police. However, due to labor union considerations, a decision was made late in March to use Wackenhut Security (DOE/NVO security contractor) for Gate 510. An Air Force security policeman was also stationed at the gate from D-3 to the end of exercise for property control and to show DOD presence. A law enforcement post instruction was written to cover the DOD policeman's procedures.

(13) Three important developments affected the Security Working Group at the March 1979 Exercise Control Staff Conference: (1) Gate 510 was to be manned by Wackenhut, (2) RADSAFE administrative requirements, which included a handout and the need for a personal data form from each participant, were married to the badging procedure, and (3) finally, it was decided to travel to Travis AFB, CA and Fort Ord, CA to deliver much of the badging paperwork ahead of time. This was designed to speed in-processing.

(14) The Marine OIC and NCOIC attended the March 1979 conference and helped develop the Marine Standard Operating Procedures. They traveled to Las Vegas and Mercury, NV. They inspected the accident site, which by then had the aircraft wreckage in place. They were able to assess the security problem and determine how they would protect the site. This proved invaluable for it allowed them to secure the area immediately upon arrival.

(15) Control of classified data during the exercise was addressed and finalized. The classified material was handled through a hand receipt system with the understanding that a determination of the need to keep certain material would be made after return to FCDNA. That material would be brought under Field Command control after the determination had been made.

(16) After the decision to man Gate 510 with Wackenhut guards was made, a problem surfaced in regard to property accountability. The amount of DOD property entering and exiting the test site would place a great burden on military personnel and forseeably produce long waits at the gate if DOE accountability and search procedures were required. An Air Force Security Policeman was stationed at the gate to account for government property. This procedure was negotiated with and approved by DOE/NTS.

(17) An addition was made to the security implementing instructions which outlined the badging procedures to be used at NUWAX-79. Badging procedures used followed the outline closely.

(18) Travel to Las Vegas, NV was accomplished on 9 April 1979 to allow final preparations for badging and protection of classified items.

m. NUWAX Coordination Center

(1) In late January 1979, it became apparent that some type of centrally organized coordination center was needed to disseminate and collect information

that was being generated by the many individuals involved in NUWAX-79 planning. Up to this time the information was flowing into and out of the hands of a few; however, there was a problem of cross-feed of information between the key people and the possibility of a loss of information. The planners realized this problem was developing and the forecast of more information being generated as NUWAX-79 planning progressed provided the motivation for the establishment of the NUWAX-79 Coordination Center in early February. The center became responsible for conducting daily and Saturday meetings involving the twelve steering groups that had been established somewhat earlier. Information and requests by NUWAX planners were processed through and out of the Center to insure all involved personnel were receiving a complete and current report. Meeting minutes and any administrative work resulting from the meeting were sent through a standard NUWAX distribution system. The distribution system was set up to insure that all those individuals tasked in the planning of NUWAX-79 received the information.

(2) At the same time, a system of flow charts and milestone charts were developed. Each steering group provided the Center with a list of milestones and dates that they felt were important in the NUWAX-79 planning and execution phase. As planning progressed, groups added milestone items to the charts in order to properly track the planning progress of their groups. Overall flow charts were developed using a consolidated format that covered the major areas of the exercise. Using the flow charts and milestone charts enabled the Center personnel to follow the exercise planning and emphasize areas that were not following the prescribed time limits.

(3) The Coordination Center also consolidated a weekly task force report update and sent it to the Exercise Director. This report was also sent through

the NUWAX distribution system to update all involved personnel. The Center was in operation from late January 1979 until the actual execution phase when portions of the Center were moved from FCDNA, Kirtland AFB, NM to the A&E building at the NTS. Certain elements of the NUWAX Coordination Center were transformed into elements of the NUWAX Operations Center that would direct the actual exercise play. The NUWAX-79 Coordination Center was an effective means of directing the planning phase and providing a central point where individuals could input data and feel certain that the information would reach the necessary personnel. It was also an effective measure to assist the exercise planners and its transition from Coordination Center to portions of the Operations Center helped eliminate obstacles that are usually found in the establishment of a new operations center.

7. SITE PREPARATION:

a. In preparing the site, two roads were constructed for access. The main road was 50 meters north of the 350m x 350m exercise area to support the official observer/visitor observation point and the ECS administratively controlled entry point. The second, less improved, road was extended from the west approximately 850 meters into the center of the area for players' use. A possible third road was planned, but not built, on the south in the event wind was a factor in the location of the observation point.

b. Aircraft wreckage was obtained from the Davis-Monthan AFB. This wreckage consisted of a C-135 fuselage (less cockpit), vertical and horizontal stabilizers, wings, B-52 under-carriages, cockpit section, pylons, and four separate J-47 engines. To facilitate shipping, the wings and horizontal/vertical stabilizers were separated from the fuselage and the fuselage was cut into three sections weighing not more than 15,000 pounds each. This

sectioning of the aircraft carcass and the additional aircraft parts constituted seven oversize truck loads which were moved in early March to the vicinity of NRDS A&E building at the NTS for off-loading. NTS support personnel observed the loading at Davis-Monthan AFB to aid in planning the NTS off-loading.

c. To avoid severe terrain damage from heavy lift equipment in the exercise site, Army CH-47 Chinook helicopters (1 from Ft. Carson, CO and 1 from a Stockton, CA USAR unit) were used to airlift individual aircraft sections into the exercise site. Site location and ground orientation of the wreckage was preplanned and premarked by surveying stakes. A team of riggers from USASIX prepared the aircraft parts for the airlift. Actual airlift operations required 2-1/2 days for emplacement of aircraft wreckage. Additional damage to the aircraft wreckage was necessary after emplacement to impart realism to represent aircraft breakup, fire, and detonations. To accomplish this cosmetic work, the 259th EOD Detachment from Ft. Irwin, CA was used by the Technical Scenario Working Group. This effort was accomplished the week of 12 March and consisted of explosive shots on each aircraft section, engine pods, and undercarriages. Burn damage, other than that resulting from explosive work, was accomplished using diesel fuel. One B43 and two B61 craters were formed by cratering charges. One B61 crater was designed for later emplacement of the intact B61 weapon in a partially buried condition. EOD site preparation concluded on 16 March 1979.

d. Emplacement of weapons, component debris, seven crew mannequins, and spreading the live contaminant remained to be accomplished in the immediate pre-exercise period. Unclassified weapon debris emplacement began on D-6 and was completed by D-5. Classified debris and weapon emplacement was accomp-

lished D-4 through D-3. Spreading of the live contaminant began late on D-2 in a limited area east of the exercise site and was completed within the exercise site on D-1. The seven mannequins were positioned within the site on D-1 prior to contaminant spreading. Remaining site preparation was accomplished early on D-day by two members of the Technical Scenario Working Groups. This consisted of a sweep of the exercise perimeter to remove remaining surveyor stakes and the burning with gasoline of two sets of the B52 undercarriage tires at 0900 PST (exercise start time).

8. TECHNICAL SCENARIO:

a. Preparation of Weapons Material

(1) The intact B43 and B61 inert exercise weapons and dummy 992T-2 parts were assembled at SLA, along with the collection of classified/unclassified B43, B61 and W70 weapon debris. This material was shipped to the NTS on 26 March 1979.

(2) Preparation of the B43 weapon prior to emplacement in the aircraft wreckage consisted of external surface damage. No internal damage was specified as an EOD requirement. Use of a 10-pound sledgehammer resulted in the following damage: Ready/safe switch window shattered; external connectors/covers bent; one plenum block protective cover broken, one pressure sensor broken from mounting and jammed into forward section; various dents in B43-1 cover; one tail fin broken from forward mounting; frangible portion of two tail fins crushed; monitor access door separated from tail section and monitor lights smashed; tail actuator safety device smashed on one side. The B43 attached to its handling dolly (H695A) was emplaced in the aircraft center fuselage wreckage in a nose-down position through a hole in the cargo flooring and jammed into the wreckage so the ready/safe switch window and the opposite

connector window were not readily accessible. Final cosmetic damage consisted of tearing the saddle bags and, with a propane torch, smoking/burning portions of the nose section, inspection record card envelope, saddle bags, and tail section.

(3) The B61 weapon, like the B43, had only external damage. Damage preparation prior to emplacement was minimal since the bomb nose and center case section were from an actual weapon trainer ballistic drop. The bomb nose was severely wrinkled from impact and its forward part shattered. The center case section was heavily abraded and scratched. Because the tail subassembly used had no external damage, it was abraded and scratched with a coarse file to blend in with the center case damage. Prior to burying the B61 approximately 7 feet (two-thirds of its length) in the ground, the front suspension lug was removed and sheared lug attachment bolts were inserted. The B61 was then rotated clockwise and moved forward in its handling cradle (H1125) to cover the ready/safe switch window and block the preflight selection subassembly access door. The B61, in its cradle, was emplaced in the ground at an approximate 30-degree angle from vertical with the handling cradle casters up, thereby providing an additional render-safe access and stabilization problem for player action.

(4) Two packages of dummy 992T-2 parts were provided by Sandia Laboratories. Preparation of these parts prior to shipment to the exercise site included fracturing four of the half-size parts into approximate quarters with a hydraulic press. Each piece was marked with serial numbers for accountability and identification. The parts were removed from the shipping containers (H1343's) at time of emplacement and placed in a predetermined pattern to represent dispersal, free of the shipping containers. The H1343s were retained

by the ECS in an undamaged condition to implement any subsequent player request for approved shipping containers.

(5) The majority of the weapon component debris for the B43, B61 and W70 detonated weapons was unclassified material comprising representative items such as parachutes, weapon case parts, arming and fuzing components, electrical cabling, and handling equipment. Classified and accountable source material parts were also provided; however, these were kept to a minimum. The weapon debris was from actual training weapon high-explosive detonations or surplus test components which were explosively damaged with controlled high-explosive detonations in preparation for the exercise. The debris was dispersed within 100 meters of each weapon detonation site. A major piece of classified debris from the B43 and B61 was imbedded approximately 1-2 meters below the surface of each respective crater.

(6) The LLL furnished one Lance warhead section in its shipping container and parts from another that represented the remains after the detonation of the warhead high explosive. The warhead was assembled at LLL using real and mock parts. It was mated to the warhead section and made ready for shipment by a team from the Sierra Army Ordnance Depot. All parts were brought up to real standards (lettering, coding, etc.).

(7) The shipping container with the warhead section in place was damaged by dropping a 2000 lb., 3 ft. o.d. x 20 ft. long, pipe on it. The pipe was angled and dropped from a height of about 15 feet on the access port and flange area of the container. This damage was to mock the effect of a jet engine landing on the container. Additional damage was accomplished by shooting shrapnel at the forward end of the container.

(8) The shrapnel entry slot in the forward end of the container was projected onto the missile skin. At this point the missile skin was damaged by explosively cutting a hole through it. This was the entry point for shrapnel passing through the missile skin to the warhead. The location of the warhead damage was accomplished by projecting the entry holes in the container and missile skin to the warhead. The warhead was further damaged by explosively driving a plate (representing shrapnel) into the warhead.

(9) In the scenario for the accident, one of the weapons detonated on impact. Shrapnel came from this weapon and damaged the above-described warhead. To obtain the fragments for this detonation, a shipping container with an inert weapon was detonated. As a result of the detonation, parts were scattered up to 200 yards from the detonation point. Many of the fragments of the container were recognizable as such. The records tube, which is attached to the outside of the shipping container, was still intact with the records slightly torn but legible.

(10) Since the explosion of the inert weapon took place in Livermore, it was necessary to tag and plot all pieces prior to transfer to the exercise site in Nevada. This plot was used to position the pieces at the exercise site.

b. Classification. The decision to use inert training weapons and classified components from weapons test programs was made to provide realism to the exercise. This also provided problems to the ECS in that physical security for these components was required at all times. Twenty USMC personnel from Marine Corps Base Twenty-Nine Palms, CA, were brought to the exercise site on D-5 to provide the necessary security prior to the commencement and after termination of exercise play, and to supplement the player security forces during exercise play, as required. Three inert training weapons, nine classified weapon components and twenty-eight 992T-2 components, for a total of

forty classified items, were identified for use in the exercise. These items were collected at SLA and LLL for exercise use. Initial plans were for the accountability and custody of these items to be transferred to FCDNA upon delivery to the NTS by DOE truck and temporary storage provided by DOE until the items were required for exercise use. At that time, the items were to be delivered to the exercise site and FCDNA was to be responsible for them throughout the exercise. After exercise termination, the reverse of the above was planned. After many discussions between DOE/ALO and FCDNA personnel, it became clear the DOD would have had difficulty with the accountability and custody of the items if this plan had been followed. To ease these diffiiculties, the decision was made that LLL and SLA would transfer the accountability for all classified items to DOE/ALO where it would remain. The items were shipped from LLL and SLA to DOE/NVO at the NTS who maintained custody of the material until it was delivered to FCDNA at the exercise site. FCDNA was responsible for custody and security throughout the exercise. After exercise termination, the reverse procedures were followed. To clarify the classification problem, the forty items were reviewed by SLA and LLL classification specialists on their respective items and then again by DOE/ALO classification specialists. It was determined that all forty items were classified; one item was CFRD and the rest were CRD and SRD. The three inert training weapons and the one CFRD item were ruled as not being sight-classified as long as they were not disassembled. All the rest were sight-classified and required visual protection from uncleared individuals. This also meant that while the components were exposed at the exercise site, they had to be protected from overhead visual scrutiny.

c. Contamination.

(1) The U.K. SENATOR V Exercise in 1976, the exercise which prompted many of the U.S. observers to recommend the United States undertake such an exercise (NUWAX-79), had Ra-224 as the radioactive contaminant. This material had a half-life of less than 4 days. In the early planning of NUWAX-79, a request was made to the United Kingdom for information on the use of Ra-224 as an exercise contaminant. A "Note On The Use of 224 Radium As A Contaminate For A Nuclear Weapon Accident Exercise," dated December 1976, was forwarded from Aldermastan by memo dated 13 January 1977. The United Kingdom then decided to use Ra-223, a 11.4-day half-life material, as the contaminate for the SENATOR VI Exercise to be held in 1978. LLL agreed to take responsibility for the acquisition and spread of the contaminant. LLL sent one of their health physicists to SENATOR VI to participate in the spreading of the contamination and to obtain information on Ra-223. A check with U.S. suppliers did not locate a reliable source of this material and Amersham, the U.K. supplier, declined to provide the material for NUWAX-79. At this point, LLL decided it would be necessary for them to prepare the Ra-223 themselves. A search finally revealed supplies of impure Actinium 227, the precursor or "parent" of Ra-223, at DOE's Mound Facility and LASL. These supplies were shipped to LLL where it was purified to less than 1 part per million (ppm) of long-lived Ra-226 in the Ac-227. The ingrowth of the Ra-223 was allowed to take place. In the meantime, LLL prepared and issued the "Radioactive Contamination Plan for NUWAX-79 Exercise" dated February 1979. This covered the preparation and spreading of the contaminant at the exercise accident site.

(2) The Ra-223 was "milked" from the Ac-227 on D-7, 11 April 1979, and it was determined that less than 0.1 ppm of Ac-227 remained. A total of 400

millicuries (mCi) were obtained and subsequently diluted to a concentration of 1 mCi/ml. This material was shipped to the site in an approved shipping container where it was further diluted to a concentration of 3 microcuries per ml (uCi/ml) and spread on D-2 and D-1, 16 and 17 April. Fallout patterns were marked prior to contaminant arrival, and weapon and aircraft parts to be contaminated were identified to the spreading personnel. All spraying was done by REECO RAD monitors with measurements of contamination levels accomplished by Fort Bragg Alpha Team members. Glycerine was not mixed with the contaminants as originally planned when it was realized that desert rodents will eat anything with glycerine on it. The skip pattern east-southeast of the exercise site was partially spread on D-2 with the rest of the material being spread at the site on D-1. In all, 20 personnel were involved in the contamination spreading. One lesson learned was that a better utilization of the people would have provided a smoother and more efficient operation. Likewise, better spreading equipment is needed - the spray nozzles clogged several times. It is believed that by using larger tanks, perhaps tanks on wheels that require only one filling, with new spray units, many of the clogging problems could be averted.

(3) The contamination spreading operation was successful. The desired levels of contamination were spread over the areas and parts designated. Radiation exposure levels were minimal. Cooperation was good between all parties involved. However, it was a difficult operation that was made worse by equipment failures, long working times, and the blowing sand.

d. Safety Analysis. In discussions on NUWAX-79 during the week of 9 October 1978, the Director, DNA, expressed concern that a safety analysis should be prepared on the radioactive contaminant planned for use in this

exercise. He believed that it was needed to provide assurance to public officials, the media and general public that the radiological safety of the participants in the exercise, the general public and the environment was being considered. Further discussions on this subject were held during the ECS meeting on 24-26 October 1978. At that time it was agreed that the Exercise Director would formalize a request for such a study to be conducted by DOE, its weapon laboratories or another qualified group. This request was made in the form of a memo to DOE/ALO, dated 16 November 1978. This memo requested that the analysis include details on the contaminant to be used, its emplacement and the radiological hazard for a worst-case situation, a credible case and possible exposures to casual observers. In a memo to LLL, dated 30 November 1978, the responsibility for the analysis preparation was given to LLL. A draft report was prepared and reviewed by LLL, LASL, and DOE/ALO personnel and a final report issued as the "Radiological Safety Evaluation Report," dated March 1979. This report was formally transmitted to FCDNA in a memo dated 5 March 1979.

SECTION B

EXERCISE OPERATIONS

1. <u>INTRODUCTION</u>:

a. A special airlift message was used to alert players to a simulated C-141 mission carrying nuclear weapons from Barbers Point NAS, HI to Sierra/Amadee Airfield, CA. The message, HQMAC/DOOMS 281503Z Mar 79, was sent on D-21 and was used as the basis for all following Master Scenario Events List (MSEL) Implementers used during the exercise. On D-5 a mission setup message, HQMAC/DOOMS 131737Z Apr 79, confirmed the simulated C-141 mission. On the same day a message was used to alert the Army Nuclear Chemical Accident/Incident Control Team (NCAIC) at Fort Ord, CA on the simulated weapon movement. The message, 131420Z Apr 79, from USASIX SF, CA, was also provided to the NCAIC team's headquarters at "Fort Mercury," NTS.

b. Exercise NUWAX-79 was initiated 18 April 1979 with the receipt of a Mayday message at 1700Z (0900L) by the Nellis Air Force Base Control Tower. Subsequent reports by the Nye County Sheriff, tourists, and visual confirmation by an Air Force aircraft confirmed by 1900Z (1100L) that a Military Airlift Command C-141 aircraft had crashed in the Nevada desert in an area of the NTS known as Jackass Flats, approximately 90 miles northwest of Las Vegas, NV. The National Military Command Center (NMCC) was immediately notified by the Nellis Command Post of the accident. The NMCC, in turn, relayed this information to the DOE, the Military Departments, and the Joint Nuclear Accident Coordinating Center (JNACC) to set in motion the sequence of events that activated the proper exercise response forces from each agency. Initial response to the accident scene was by the Army Nuclear Chemical Accident/Incident Control Team (NCAIC) from Ft. Ord, CA. This team, under the command of

Brigadier General Carlson, Assistant Division Commander (Maneuver), 7th Inf Div, Ft. Ord, CA, assessed the problem, began to secure the crash site, initiated EOD procedures, and called for the required assistance. Each day's events from D-day through D+6 are presented, in detail, in the following narrative.

2. EXERCISE NARRATIVE: The following is a chronological narrative of events as reported by the NUWAX-79 Operations Center:

a. D-day (18 Apr 79)

(1) At 0830L, the Nellis AFB Tower was given an implementer stating that MAC flight SAAM 1213 was diverting to Nellis AFB due to bad weather at its original destination, Amadee Army Airfield, CA. Nellis Control Tower was also provided the ETA, weapons cargo, and requested notification of local fire and crash crews. At 0900L, an implementer given to Nellis Tower indicated that Los Angeles Air Traffic Control Center had lost contact with MAC 1213 and had observed a Mayday squawk prior to its disappearance from the radar.

(2) Shortly after this word was received (0915L), the simulated Nye County Deputy Sheriff (NUWAX Operations Center) reported by phone call implementer to USA, "Fort Mercury" that he had observed a flash and smoke 30 miles NW of Mercury, Nevada. In the meantime, Nellis forwarded information indicating a potential Broken Arrow to HQ Tactical Air Command (HQTAC) at 0955L. About one-half hour prior to the HQTAC notice (0920L), a simulated tourist reported to a simulated gateguard that he had seen a plane crash while he was driving East on U.S. 95 near Lathrop Wells. He thought that the crash was west and south of that town. After providing the information the man drove off. The latter tourist report implementer was passed by phone to the "Fort Mercury" Operations Center, which was actually the NCAIC Command Post at Mercury, NV, by the NUWAX Operations Center. The Nuclear Chemical Accident/

Incident Control Officer (NCAICO), in reacting to this report, requested additional information on the tourist and said that his unit was going to look for the aircraft. At 0955L, a simulated USAF F-4, call sign RINGO 21, located the crash site (293° radial of Nellis TACAN, 68 nautical miles (nm)) and reported back to Nellis Tower (hard copy implementer). The report stated "that it appeared to be a C-141, there is no evidence of life. Aircraft badly broken and burning."

(3) At 0942L, a "Fort Mercury" Army reconnaissance helicopter circled the accident site and reported a downed military aircraft wreckage strewn over a 500-meter area. The NCAICO called the NUWAX Operations Center requesting assistance in notifying local fire department and law enforcement agencies. They were told that Nellis AFB has been notified and that the simulated local civilian firefighting equipment had been used in a fire the night before and was unavailable. Based upon the visual report of RINGO 21, the NMCC was notified of the accident by the Nellis Command Post through an exercise OPREP-3 Pinnacle/Broken Arrow report. The Army NCAIC sent a Broken Arrow message at 1035L. The NUWAX Operations Center was advised at 1049L of activities of the 22nd AF Crisis Action Team (CAT).

(4) At 1120L, the NCAIC team was given authority to deploy and at 1131L, the helicopter party left "Fort Mercury" with the ground party deploying at 1134L. At 1146L, the NCAIC requested partial deployment of the Nellis AFB Disaster Response Force (DRF). Two requests from the Army NCAIC team were answered by the NUWAX Operations Center shortly after NCAIC team deployment. At 1139L, the NCAIC requested information on the water table in the area, and at 1149L the NCAIC requested that Federal Aviation Agency (FAA) issue a Notice to Airman (NOTAM) around the crash site. The NUWAX Operations Center, responding to these calls, gave the required information on the water tables and acting

as the FAA set up a restricted area of 10 nautical miles around the crash site and 10,000 ft minimum altitude. Deployment of the NCAIC team was completed when the air/ground teams arrived on site by 1221L. At 1224L, the players were donning Anti-C clothing preparing to enter the crash site. The EOD team entered the area at 1249L, after having made note of the existing wind direction.

(5) An implementer involving a confrontation between the On-Scene Commander (OSC) and a curious citizen who was to challenge the OSC in areas of legal jurisdiction, health and safety, and security of classified materials was requested at 1245L by the on-site controllers. The event involved one old landowner, partially drunk on wine, and his retarded nephew (portrayed by actors). They were wandering in the crash area outside the contaminated area when the NCAIC team arrived. The nephew appeared to be contaminated (simulated by two Coleman lantern mantels sewn under his collar). A sack carried by the old man contained uncontaminated metal debris, lunch, a bottle of wine, pitchblende, and unclassified components. Restraint was required to keep the pair from leaving before the authorities arrived. This event began at 1220L and ended at 1451L.

(6) A follow-on event was related directly to the foregoing implementer which involved the two curious citizens. This event involved a police patrol car and an actor portraying the part of a deputy sheriff. The deputy arrived on scene at 1350L and the situation with the Spanish-speaking individuals was terminated by 1516L.

(7) At 1404L, the NCAIC team requested that a federal marshal come to the accident scene and link up with the security element. Later, 1408L, the NCAIC team requested representatives from the health department, local

hospitals, environmental safety, and fish and game departments. The Operations Center advised the NCAIC that these agencies were notified (simulated) and were "on call."

(8) At 1420L, the EOD team was reported to be approaching the tail section of the aircraft. Real-world demonstrators arrived at DOE's Nevada Operations Office in Las Vegas at 1433L and staged a peaceful protest demonstration. At 1440L, the EOD team reported that they had found one body (mannequin) and one weapon (W70). Shortly after this report, the NUWAX Operations Center received word that the Nellis DRF had departed Nellis at 1310L with an estimated time of arrival (ETA) at the crash site of 1510L. The OSC requested heavy equipment to move wreckage and weapons at 1454L. At 1500L, the EOD team reported finding two more bodies (mannequins). Very soon after this report, the EOD team located the undetonated B43 (1508L)and began assessing the damage.

(9) A real-world medical emergency occurred at 1513L. A suspected heart victim at Harvest Eagle required evacuation to Nellis AFB by ambulance. The problem later was determined to be an epileptic seizure. The individual was returned to duty on the same day. The Navy EOD team from China Lake arrived at 1500L. The Air Transportable Radiac Assistance Package (ATRAP) which had arrived earlier (1456L) at Nellis AFB was notified by the site controller to deploy to the site on 19 April 1979. At 1526L, the EOD team was reported to have finished assessment of the B43 and they were moving to the B61.

(10) An implementer involving the arrival of three newsmen (actors) at the accident scene was initiated at 1539L. The reporters requested details of the accident, an interview with the OSC, a visit to the accident scene, information concerning radiation, etc. The event was terminated at 1621L. At 1451L, the NCAIC team alerted the Nye County Mortuary (Operations Center) that

three contaminated bodies would be transferred to that facility. A few minutes later (1548L), the EOD team located a fourth body. A call from the FCDNA/ liaison office at Livermore was received by one of the on-site controllers at 1543L requesting billeting information for eleven members of the Livermore Accident Response Group (ARG). The caller was informed that the information could not be provided by controllers and would have to be obtained through player channels.

(11) An on-site controller informed the NUWAX Operations Center of the arrival of the Nellis DRF at 1627L. The team consisted of 90 personnel, one ambulance, one fire truck, one bus, and one 2-1/2 ton truck. The hard copy of the simulated emergency action message with the NCAIC warning order was received at 190050Z (1650L). This ensured that the NMCC had released the emergency action message to the DOE, JNACC, and Services. At 190057Z (1657L), MAC message (DTG 190020Z APR 79) was passed to the OSC. The message implementer asked the OSC whether he had taken the Safety/Accident Investigation Board into consideration.

(12) The OSC was reported to be establishing a perimeter at 1659L. At 1717L, some members of the DRF attempted to enter the southwest corner of the accident site without protective masks. The on-scene security controller prevented this entry. By 1734L, the players had located the W70, B43, B61, and two classified components. At 1738L, the Operations Center was informed that the EOD team was suited up and was reentering the hot area to attempt render-safe procedures (RSP) on the B43.

(13) The arrival of the second Navy EOD team from Hawthorne, NV was noted (1824L). A call from the on-site security controller to the Operations Center reported that some problems had developed within the security area. The

Nellis DRF security team had begun to deploy around the accident site and had been stopped on the edge of the outer contaminated area (skip area) by the on-site controller. The DRF security was totally unaware of this contaminated area since the player monitors had not discovered it as yet. The Nellis DRF security team was stopped and directed not to move again without word from the on-site controller. The player security perimeter had been established around approximately 1/3 of the exercise area, and the nonplayer Marine contingent was required to provide the additional security until the next morning.

(14) Word was passed to the Operations Center at 1833L that the EOD team had ceased RSP on the B43 because of access problems and was looking for the second W70. At 1839L, the second element of three EOD teams entered the area to check the B61. Word was then received (1840L) that the players would leave the site in 13 minutes. The JNACC message (DTG 182231Z APR 79) implemented NMCC's request that nuclear capable response elements deploy to the exercise site.

(15) All exercise play in cordon ceased at approximately 1900L on D-day, and most of the controllers and umpires returned to the NUWAX Operations Center shortly thereafter. Part of the LASL equipment arrived on scene (2120L). Member of the DOE initial Accident Response Group (ARG) from LASL arrived at Mercury at 2200L. One Navy EOD team called NUWAX Control at 2210L and requested directions to the NTS. They were informed they must obtain their information through player channels. Nellis AFB Command Post later called and wanted to know if the Navy EOD/RADCON teams at Nellis should respond then or wait until morning. The Nellis AFB Command Post was told to utilize player communications channels.

b. D+1 (19 Apr 79)

(1) The DOE ARG arrived at Harvest Eagle at 0040L and was advised that the unit could not be provided blankets. The ARG had responded to the accident site as per their instructions, but all necessary arrangements to provide them the necessary provisions had not been made. In order to facilitate the billeting of the ARG, blankets were obtained by the ECS and provided to the ARG. At 0700L, the players initial planning meeting was conducted at Harvest Eagle.

(2) JNACC advised that the East Coast Navy EOD and RADCON teams were being delayed by aircraft problems and had an estimated time of departure (ETD) of 1700Z (0900L). At approximately the same time, the first EOD team was preparing to pass through the hot line and were told that they were not to carry canteens on the outside of their Anti-C suits. At 0853L, an EOD team approached the hot line for entry into the area with the purpose of visually checking the B43 and W70. At 0935L, the EOD team had located some classified components and was receiving a high radiation count from the tail section of the aircraft. The national press (actors) arrived at 0954L. A few minutes later, the 22AF DRF OSC BG James Gardner, Vice Commander, 22AF Travis AFB, CA, arrived on-site by helicopter from Nellis AFB. During this same period of time, players were informed that their request for aerial photo support was being simulated because of the cost of relocating reconnaissance aircraft from Texas. The JACC/CP communications package started arriving at Indian Springs Auxiliary Airfield, NV at 1015L; however, it was not moved until after 1300L because of problems with obtaining a flatbed trailer with sufficient width to move the equipment. The national press implementer was terminated at 1045L. A Navy EOD team reported a complete render safe on the detonated B43 at 1030L. By 1147L, the aircraft wing and engine covering the W70, which was still in its

shipping container, had been removed. The Navy EOD team rendered safe the B43 in the wing-root section of the aircraft at 1218L and an Army EOD team had gained entry to the W70 and electrically safed it by 1221L. The B43 was removed from the wreckage by a crane at 1254L and by 1544L it had been moved to the staging area.

(3) At this point, the ECS observed that the OSC was having problems communicating to higher headquarters. The 22DRF departed Nellis at approximately 0930L and by 1337L they still had not arrived at the site. The JACC/CP was also still moving from Indian Springs to the site.

(4) Actors representing pickets and local press arrived at approximately the same time as the Air Force On-Scene Commander arrived. This implementer continued with a Nye County Deputy Sheriff arriving on scene at 1500L and was terminated at 1526L by the Operations Center.

(5) A DOE/ARG request for an aerial survey was approved by the Exercise Director, and EG&G, through DOE/NVO, was tasked to conduct a survey the following morning. JACC/CP arrived on-site after 1430L and the JACC/CP commander made contact with the On-Scene Commander at approximately 1500L. By 1545L, the ECS was notified that the Army perimeter security would not be complete and that the Marine security should not be removed because of real-world security needs.

(6) A Joint DOD EOD team found some weapon documents near the detonated W70 at 1544L. At approximately the same time, an EG&G equipped helicopter was launched to take aerial photographs of the area. The removal of shipping documents from the intact W70 shipping container at 1609L provided the players with documents from both W70s. EOD operations were ceased for the day at 1640L when a medical team was dispatched into the area to deliver the bodies

(mannequins) to a decontamination area. An Army helicopter was launched during this time to help locate the bodies (mannequins). The first bodies (mannequins) were brought to the hot line at 1754L. Decontamination of the first mannequin started at 1841L.

(7) At 1743L, it was confirmed by the controller staff that part of the problem with message traffic had been corrected and all OSC messages were being received by the NUWAX-79 Operations Center. A major event that occurred on D+1 was the change of command that took place at 1800L. The Army OSC, BG Carlson, after an extensive change-over briefing, turned over OSC responsibilities to BG Gardner, 22AF. This change of command was one of the major objectives of the exercise.

c. D+2 (20 Apr 79)

(1) Exercise play began at 0700L. An EOD team from the 2701st EOD Squadron, Hill AFB, UT, arrived on D+2. The Anti-C suits were issued at 0800L by REECO for in-cordon play. At 0830L, an EOD command post was set up. The NUWAX Operation Center received a call from the OSC at 0840L asking for the sheriff, attorney general, and USAF Office of Special Investigation (OSI). The Operations Center, acting as information center, stated that the sheriff would be available about 1100-1200L but that the attorney general was unavailable and the OSI must be reached through Nellis AFB.

(2) Early in the morning it became apparent that the players were having trouble processing personnel through the hot line because of USAF security requirements. The real-world press was reported at Lathrop Wells at 0915L. At 1000L, the local press and national press (actors) arrived at the accident site. Another implementer was inserted at 1211L because the players had not conducted an adequate radiation survey in the area of their perimeter security.

The implementer requested initiation of a radiation survey outside the aircraft wreckage area. At this same time, a verbal implementer was issued to obtain swipes from the helicopter that was used earlier in the morning in radiation survey mapping of the exercise site in order to determine possible contamination of the helicopter due to its hovering and possibly resuspending contaminant in the dust cloud.

(3) The aircraft manifest was discovered in the aircraft cockpit at 1235L by a Navy team. Later, at 1303L, the OSC requested a backhoe to aid the EOD digging effort in the crater area. At 1220L, the Exercise Director authorized a helicopter flight at 150 ft over the crash site for further radiation survey.

(4) A 1330L press conference was initiated by an implementer and conducted by the OSC. Numerous requests for information from newsmen (actors) prompted the press conference, and questions on radioactivity, property damage, nuclear weapon transport, cause of the accident, etc. were asked. The conference lasted until 1610L. At 1408L, an on-site controller reported that the radiation survey helicopter flight had discovered an area of contamination in a skip area away from the main crash site. The OSC sent in monitors and security to define and secure the area.

(5) At 1447L, during the visitors day presentation, two actors in a dune buggy attempted to penetrate the secure area. The dune buggy drove up near the security perimeter, a person got out, picked up something and proceeded toward the accident site. Both driver and rider were immediately detained and led away to the player hot line where they were monitored for contamination and subsequently released. The formal visitors day program ended at 1530L.

(6) The B61 was reported electrically safed at 1530L. At 1543L, the 22AF DRF requested an airlift for five 4-wheel drive jeeps and two 2-wheel drive jeeps. A new implementer was inserted involving a grieving mother of one of the crew members killed in the accident, at 1554L. The OSC was expected to deal with this situation and calm the obviously distraught woman. The event terminated at 1610L.

(7) The Atmospheric Release Advisory Capability (ARAC) was requested at 1626L after the OSC was prompted using an implementer.

(8) The EOD team working on the W70 found a hole in the warhead and notified NUWAX operations that they were going to enlarge the hole. The OSC reported at 1710L that there were 152 Air Force, 34 DOE, 31 Navy and 10 Marine Corps personnel at Harvest Eagle.

(9) At 1721L, the render-safe operation on the W70 ceased for the night.

(10) A good radiation survey established the perimeter of the contaminated area and security was properly established away from the contamination. Play ceased at 1900L.

d. D+3 (21 Apr 79)

(1) Exercise play started at 0700L. The first activity at the accident site was an Army EOD team's arrival at 0804L. The ECS was notified that two SAAM missions had been used the previous night to fly two sorties to bring in jeeps and trucks at the OSC's request. This used the DRF's remaining standby MAC SAAM flights.

(2) At 0835L, a request for actual winds at the time of the accident was received by the ECS. Actual winds of W/NW at 5 knots were given to the OSC at 0906L and these winds were within a few degrees of what had been used during the planning of the exercise. A team composed of DOE/ARG and Army

EOD personnel entered the site at 0839L with radiographic equipment to be used in the assessment of the W70 safing problem.

(3) The OSC was having problems processing people through the hot line because of a comprehensive security badging process established by the AF DRF. At approximately 0915L, all badges except the DOE film badge were removed to help speed up entry into the area. An implementer was put into play at 0915L to allow EOD to continue with RSP of the W70, and to allow other players to simultaneously conduct other operations to assure completion and evaluation of all exercise objectives.

(4) A press conference was convened at 1040L when national and local press (actors) arrived at the OSC briefing tent.

(5) While the press briefing was being conducted, the EOD team started working on the W70. At 1056L, a simulated State Court Temporary Restraining Order (TRO) was served to the OSC by an actor. This implementer continued to play until 1150L. The radiographs taken of the W70 were reviewed at 1136L; however, the Army EOD team had continued with the RSP without waiting for the radiographic information being provided by DOE. An aerial radiation survey flown by an EG&G helicopter with the Surveillance and Nuclear Detection System (SANDS), a DOE/ARG asset, started at 1300L. The helicopter completed the survey at 1418L and departed the site.

(6) The USAF Contamination Disposal Team arrived at 1200L from Kelly AFB, TX. Also, the ATRAP issued instruments to the Navy and Air Force teams entering the area. An Army RADCON team was sent into the area to plot the site contamination. The priority was to establish some precise readings that would allow the entry control point and hot line to be moved closer to the aircraft wreckage. The first of three teams entered the area at 1412L. A Navy EOD and

DOE team was dispatched at 1449L to help locate and mark 992T-Z target rings. An Air Force team was dispatched approximately the same time to continue work on the B61. By 1541L, the RADCON team had established a new base line and was preparing to have the hot line moved closer to the wreckage. Radiation plotting continued and the presence of Ra-223 was established by an analysis of soil samples conducted by LLL. At 1606L, some classified components were found in the B61 crater.

(7) In the late afternoon, the players established a procedure for safing the W70. At 1706L, the safing team asked for an inert gas to help with their proposed procedure. A message was sent later that night and the nitrogen gas and regulator would be provided to them by the ECS the next morning. At 1616L, the new hot line was established and manned. Another significant achievement was the discovery of a major W70 classified component in the tail section of the aircraft by the USMC EOD team. The hot line was closed at approximately 1800L and exercise play, except for maintenance of perimeter security, was completed for D+3. A planning conference by the OSC was conducted daily at 1930L. The status of exercise activities was reviewed and plans were developed for implementation on D+4.

e. D+4 (22 Apr 79)

(1) Joint teams of Air Force and USMC personnel were making preparations for entry through the hot line by 0740L. Because the players were still using a single hot line entry control point and lacked a formal recovery plan, an implementer was presented to stimulate the On-Scene Commander to use DOE/ARG health physics support in developing and implementing plans for material recovery and packaging, radiation mapping, equipment decontamination, and site

cleanup. Also, a second hot line entry control point was to be immediately established. By 0810L, this second entry control point had been established for removal of components from the contaminated area, and the original hot line had been nearly doubled in size. Information was received by the Operations Center that a 20-meter grid keyed to geographic location would be used in the recovery and radiological surveys.

(2) The first EOD team into the area consisted of both USN and AF personnel and they were moving down range by 0848L. Because of questions about possibly contaminating film badges, all teams entering the area were advised by the ECS to wear their film badges under their Anti-C suits.

(3) A second EOD team entered the area at 0915L. The second hot line was originally set up for processing components but was later changed to include personnel. An Army RADCON team also entered the area with a FIDLER to conduct a radiological survey.

(4) At 0941L, the players requested that a change of wind direction not be implemented as it would cause a change in the location of the hot line entry control points. In order to insure achievement of exercise objectives, approval was granted and the entry control points remained in their original location. The location of additional target rings located by the search teams was logged at 1025L. At 1030L, an implementer generated a confrontation between the On-Scene Commander and the Las Vegas mayor (actor) who was demanding a briefing. This implementer was terminated at 1125L.

(5) By 1230L, a RSP using nitrogen gas and foam was used on the W70 and seemed to accomplish its purpose. The Army Radiological Advisory Medical Team had completed a plot of the skip area and was out-processing through the hot line by 1256L. Most of the Army NCAIC emergency response team members had departed the site by 1300L, but 30 Army members remained to help with RADCON

and security. The location of the PANTEX tent was established and personnel were available for identifying weapon parts by 1400L. The OSC was acting on the cleanup program, and at 1431L, he designated the DRF medical officer as OPR who immediately set up planning meeting times. The B61 was removed from its crater at 1515L and immediately taken to the hot line. Heavy equipment was moved to the W70 and the weapon was brought to the hot line by 1625L. At 1600L, an implementer that caused the attempted infiltration of the perimeter security of the accident was initiated. It was terminated with the capture of the four infiltrators at 1647L, after the simulated killing of two security guards. The ATSD(AE) (actor) arrived at 1825L and requested a briefing from the OSC on the contamination removal plan. Also, the players were tasked to radiograph the entire warhead of the W70 prior to subsequent movement of the weapon. The OSC's daily press conference was terminated at 1800L and the hot line closed for the evening.

f. D+5 (23 Apr 79)

(1) Exercise play began at 0700L. The players, EOD and RADCON teams, suited up and continued their search for classified components and their radiation mapping of the site. Problems with JACC/CP FTA-28 circuit conditioning equipment had not been corrected as of this time. AUTOVON phone patching continued to be processed by WSC-3 communications satellite terminal and McClellan AFB. High frequency teletype with Norfolk DSC was satisfactory throughout the day. At 1030L, a press briefing (actors) was held by the OCS. Free ranging questions were asked until the implementer was terminated at 1200L. In addition to a press release, which included statements from the Secretary of Defense (SECDEF) representative who visited the site on D+4, five people were

interviewed. The chief of security police was interviewed on the attempted penetration of National Defense Area (NDA) and the subsequent simulated killing of two security police. Tritium testing procedures were discussed by Army EOD, Walter Reed Medical Center and LASL representatives. During this time (1010-1025L), the OSC was called by a simulated Nevada senator.

(2) Near the close of the press conference, 1042L, two horsemen (actors) appeared outside the National Defense Area. They were acting as ranchers and sons of the owner of the land where the crash occurred. They were checked for contamination and were required to provide urine specimens. No contamination was found. The press filmed this entire sequence of events, and the event terminated at 1224L.

(3) At 1130L an implementer was initiated involving the simulated flight of a news helicopter over the accident site. This event ended at 1145L.

(4) At 1405L, the OSC was served with a Temporary Restraining Order (TRO) by a Federal Marshal (actor). The TRO was issued by the U.S. District Court, NV, and ordered immediate cessation of crash site activities. The OSC simulated contacting the Judge Advocate General (JAG) by telephone and was advised to continue operations pending further guidance.

(5) At 1616L, two ECS personnel who had high alpha counts on ECS planted nasal swabs were checked by the OSC's medical staff.

(6) Exercise play ceased at approximately 1700L.

g. D+6 (24 Apr 79)

(1) Exercise play commenced at 0700L. Activities included operation of the hot line, preparation of weapons components for shipment to a storage igloo at the NTS, and a team composed of USAF/USMC EOD and DOE/ARG continued the search for classified components. At 0950L, final confirmation of the safing

of the W70 was made. Members of the ECS entered the hot line to observe the search effort and to recover classified components outside the area where the player search was being conducted. The OSC submitted his plan, by message, for cleaning the area. Exercise play was terminated at 1030L. At 1100L, player search efforts were terminated.

(2) Following exercise termination a rope barrier was erected around the exercise site and the area was posted with appropriate radiological warning signs. The Marine security element established and assumed responsibility for exercise site security. The search continued by members of the ECS for classified components which had not been located. The ECS members were assisted by a survey team from Holmes and Narver, Inc.

(3) Commencing at 1230L, a post-exercise critique was conducted at the A&E building, NRDS. Details of this critique are found in paragraph 3. The search for classified components was suspended at 1600L. The one component still missing was a piece of a 992T-Z target ring. A plan was developed by the ECS to expand the search effort on D+7 to include the storage igloo where the other weapons components had been moved, and to resurvey on the morning of D+7 all the locations where target rings had been emplaced using more sensitive radiation detection equipment. This terminated activity, except for security at the exercise site, on D+6.

h. D+7 (25 Apr 79)

(1) Efforts to locate the missing weapons components began at 0800L with a search of the storage igloo and resurvey of the projectile parts locations at the accident site. During the resurvey of the accident site, the missing piece was located. The survey on D+6 had been in error by about 2 feet. By 1300L, all activity within the cordon had ceased.

(2) The exercise area was turned back over to the Manager, Nevada Operations Office by the Exercise Director effective 26 April 1979.

3. <u>EXERCISE CRITIQUE</u>:

a. The critique of NUWAX-79 was conducted on the afternoon of 24 April 1979. The Exercise Director, MG Tate, opened the session with a few remarks concerning the exercise. He mentioned that NUWAX-79 was a first-of-a-kind exercise conducted in a no-fault environment to promote the learning process. He pointed out the difficulty that the On-Scene Commanders face in nuclear accident situations and anticipated that the experience gained in NUWAX-79 would be highly beneficial to all who are or will be concerned with such situations.

b. After the opening comments by MG Tate, Dr. Gardner of LASL presented the NUWAX-79 technical scenario, including a discussion of the site preparation phase. Dr. Gardner outlined the general guidelines which the Technical Scenario Working Group used to plan and execute the various facets of the exercise; e.g. promote simplicity, ensure that all Services participate, involve currently used weapons, plans, change of command, use live contaminant, impose 7-day time limit, limit crash site area, pose significant EOD problem, etc. He then described the actual site configuration which included the contaminant pattern and the locations of the aircraft parts, classified components and simulated casualties. The remainder of his discussion centered upon the EOD scenario and how the site was prepared.

c. Dr. Chambers of LASL, who was the chief umpire for the exercise, presented a detailed critique of key areas and offered some lessons learned. Areas covered included command and control, scientific support, radiation control, EOD procedures, communications, security, legal, logistics, and

reporting. The players were then given the opportunity to present their assessments of NUWAX-79. Brigadier General Carlson, the initial OSC from Ft. Ord, CA was the first to speak. His assessment was followed by that of Brigadier General Gardner, the USAF OSC from 22nd AF, Travis AFB, CA. After the comments by the OSCs, Mr. Clark of DOE presented his assessments. Mr. Clark then introduced his senior representatives, Mr. Wechsler from LASL and Dr. Ide from LLL, who made additional comments regarding the exercise.

d. Following the player assessments, MG Tate opened the session to questions/comments from the floor. Several comments were made to clarify or elaborate on some points made in the umpire and player briefings.

e. Major General Cody, in his remarks, asked that all participants in NUWAX-79 carry the experience and spirit of the exercise back to their organizations to facilitate the learning process. He also pledged support from DNA to ensure that the lessons learned and experience gained from NUWAX-79 are presented to and shared with higher headquarters, including OSD, JCS and the Services, through briefings and a sound after-action report.

f. In the closing remarks by MG Tate, several peripheral areas were reviewed that had not previously been covered, including the visitor/observer program and real-world public affairs. General Tate also discussed two implementers that were inserted late in the exercise. These implementers involved, first, the public concern with respect to the radiation hazard, the measures taken to protect the public and consideration of the environmental consequences and, second, the generation of an outline plan for contaminated area cleanup. His purpose in mentioning these two areas was to point out that there was a great deal more involved in the response to a nuclear weapon accident than just locating the weapons and rendering them safe.

g. The critique lasted for 3.5 hours. A complete verbatim transcript of the critique is available from FCDNA upon request.

4. VISITOR/OBSERVER PROGRAM:

a. D-Day: On D-day, 18 April 1979, 78 U.S. and 12 UK observers reported to DOE's Nevada Operations Office (NVO) where they received initial welcome/administrative remarks, a briefing on the radiological aspects of NUWAX-79, and badges. Following this they were transported in two buses to the A&E building at the exercise site. Enroute to the exercise site, bus escorts narrated a script containing points of interest along the way. At the A&E building the observers were provided refreshments and then assembled in the auditorium where they received a NUWAX-79 briefing by Major General Cody, Deputy Director Operations and Administration, DNA, and a briefing on U.S. assets of accident response by the Commandant of the Interservice Nuclear Weapons School (INWS). Following this they were transported by bus to the Harvest Eagle Camp for lunch. After lunch, they were transported to the bleachers near the accident site for a series of presentations by the INWS and close observation of the exercise using binoculars. Prior to their departure that day, they received an update of D-day exercise events and a preview of events for the following day, D+1.

b. D+1: Again on D+1, 78 U.S. and 12 UK observers were transported from the NVO to the A&E building where they received an exercise event status update presented by the Exercise Chief of Staff. Following this they were transported to Harvest Eagle for lunch and then to the bleachers for the remainder of the day. During this time they observed player activities in the controlled area, small groups visited the player command post (CP), and they witnessed the simulated picket demonstration. Forty U.S. and UK observers were escorted in

several groups through the administrative hot line into the controlled area to closely observe the crash site and player activities.

c. D+2: On D+2 Visitors Day, 53 visitors arrived at the NVO where they received welcome and administrative remarks, briefings on NUWAX-79 by Major General Cody and a presentation on U.S. assets for accident response by the Commandant of the INWS. They then received a briefing on the radiological aspects of NUWAX-79. Following this they were transported by bus to the exercise site and the Harvest Eagle Camp for lunch. After lunch they were transported to the bleachers where they received a NUWAX overview by the Exercise Director, Major General Tate, remarks from Major General Cody, the On-Scene Commanders, Brigadier General Gardner and Brigadier General Carlson, and presentations by the INWS. Additionally, they received a summary of the exercise scenario for the remainder of the exercise and were given an opportunity for close site event observation using binoculars. The UK and 45 U.S. observers spent this day on a DOE-conducted bus tour of the NTS forward area. This included Sedan Crater, Command Post 1, the Environmental Protection Agency Farm, Frenchman Flats, a drilling equipment yard and a test tunnel tour.

d. D+3 - D+6: D+3 through D+6 saw an anticipated decrease in the numbers of observers from 35 to 22. During this time the observers reported to the NVO and were transported to the exercise site by bus daily. They continued to receive exercise updates from the control staff and informal presentations by key members of the exercise staff. They visited the exercise operations center, player CP, hot line, the accident site security, EOD and communications elements. Additionally, they were given opportunity daily for suiting up in protective clothing and entering the controlled area for close-up observation

of EOD render safe and RADCON team operations. They also viewed video tapes of the simulated press activity conducted throughout the exercise.

e. Critique Sheets: Fifty-two critique sheets were collected from observer personnel. Comments were meaningful and indicated a conscientious effort to provide meaningful recommendations based on their experience and training. Collectively, the critiques reinforced those observations made by the Exercise Control Staff.

SECTION C

OBSERVATIONS

1. DOE:

a. Scenario

(1) Clarity, Realism, Adequacy.

(a) With some exceptions, as noted in the "conduct" of the exercise, the basic accident scenario was adequately and clearly represented. The DOE players were able to develop a "theory" as to what had happened during the accident, and it was subsequently determined to be very similar to the one planned by the ECS.

(b) Operational security restrictions were applied rigidly throughout the exercise. Few, if any, of the players (particularly the military players) knew why they had to cover up everything at certain times. Further, it was unnecessary for them to have to cover a large number of unclassified objects thereby causing significant delays in EOD team action.

(c) The DOE players were advised that the contaminant was laid prior to the start of the exercise according to the scenario wind direction and intensity. When the ECS was asked what the exercise wind was, ECS advised the players to "play actual weather." The reason for that (i.e., that the actual weather had fortuitously nearly duplicated exercise weather) wasn't revealed to the players for several days. The result was some confusion and delay.

(d) Although it is recognized that MAC/SAAM scheduling is fairly rigid, the assignment of the Kirtland C-130 loading for LASL equipment, and the Travis C-141 loading for LLL equipment so early (1200PST, less than 2 hours after the first notification), added an element of unreality. Therefore, the DOE

players declared a delay of their own to add realism, and then simulated a MAC/SAAM request through JNACC for equipment airlift after arriving on-site and evaluating the equipment requirements.

(e) In some cases, exercise artificialities were a problem. Some examples are: 1) the serial number "NUWAX-79-70" on the damaged W70-2 was "obviously" not a serial number to some of the players; hence, no initial effort was made to obtain data from the Record of Assembly (ROA) of the weapon; 2) the dummy SN on a critical part of the B43 was not believed to be real; and 3) the inability of either the Army or Air Force to get an aerial photo mission, coupled with a lack of maps, caused the DOE to change priority regarding the use of EG&G aerial support; i.e., the photo mission was given first priority, which delayed availability of off-site aerial radiological survey by 1 day.

(f) The inability to confirm from the manifest and custodial receipts at the point of origination of the flight was unrealistic. The ECS apparently depended on the players finding the manifest and the W70 receipts in the cockpit. Much time on D+1 was spent trying to get that information from external sources. (Hopefully, duplicate manifests and receipts are maintained to cover the possibility of aircraft loss by fire.) After the manifest was found, an umpire (or controller) made corrections and initialed them. This action resulted in further confusion because the corrections were incomplete. Data from the manifest and receipts was important in identifying specifics of the weapons involved in the accident.

(g) Several other system scenarios included flaws that tended to mislead the players. Outside of the defects in serial number identification, and the fact that certain aspects of each system can be ascertained from real part and serial number types, some of the packages were incomplete. This tended to

develop into a mistrust of the supplied documentation, as well as whether the shipped package was truly defined. Two specific instances involved the W33 system. No shipping container parts were scattered in the accident site, although the line item from the manifest identified a complete H-1343 package. Correspondingly, two MC-1162s are an integral part of each such package while, actually, only one was placed with each 33 set. The lack of information from serial numbers and ALT identifications is significant for assessing the criticality problems, as well as certain classified component recovery requirements.

(h) Badging requirements for NTS entry, first through Mercury and then through Gate 510, resulted in significant delay of the DOE players' arrival at the crash site and detracted from the realism. The team could have arrived at least 2 hours earlier if badges had not been locked up (after 2000) in an unattended trailer.

(i) Finally, in a real accident, both the DOD and DOE senior personnel would have been inundated with requests for information, numerous status reports, questions, guidance, etc., from their headquarters counterparts. In this exercise, this type of pressure was not included.

(2) Site Location. The site location was adequate. In a real-world situation it is possible that a plane crash could occur in a less remote area. For future exercises, consideration should be given to having the exercise in an area somewhat closer to a population center, to better simulate a real-world situation.

b. Use of implementers. ECS anxiety about player progress on certain elements of the exercise led to implementers which interfered with player planning. The most serious case was the implementer involving the D+4 briefing

for the Secretary of Defense representatives. Although the implementer was probably appropriate under the circumstances, its effect was to completely eliminate the DOE effort to initiate joint DOD/DOE long-range recovery and decontamination planning.

c. Chronology.

(1) D-Day - 4/18/79

MST	
1113	DOE/JNACC receives call from DOD/JNACC of suspected Broken Arrow.
1115	DOE/JNACC receives call from EOC/HQ. Possible Broken Arrow. No alert yet.
1130-1145	Initiate notification of suspected Broken Arrow to LASL, LLL, SLL, SLA, EG&G and Mason & Hanger (M&H). No alert yet.
1215	EOC/HQ confirms Broken Arrow at 36° 48'N and 116° 24' W. C-141 crashed with Class A explosive on board. EACT being assembled. Told to alert ARG but not to deploy.
1225	Initiate notification to LASL, LLL, SLL, SLA, EG&G and M&H of confirmation.
1258	No deployment authorized.
1303	Begin information calls to SAN, NVO, LAAO, SAO, and AAO.
1309	EOC/HQ is advised that ARG is alerted.
1325	T. Clark is called by EOC/HQ and appointed DOE Representative. Clark picks J. Roeder as DOE Coordinator.
1335	Clark is advised by EOC/HQ that two each of 43's, 61's and 70's are involved and parts from 33's.
1340	Receive call from EOC - Informed that Clark is DOE representative - approval for deployment of IARG and MAC aircraft given, hard copy to follow.
1347	Initiate calls to LASL and LLL. J. Wechsler designated as Sr. Scientific Advisor from LASL and R. Ide designated as Sr. Scientific Advisor from LLL.
1400-1546	Begin getting information concerning DOD response. Initial ARG (IARG) personnel being identified.
1435	DOD/JNACC advises that On-Scene Commander is Army General Carlson from Fort Ord and that he will be succeeded by AF General Gardner from Travis AFB.
1435-1600	Numerous attempts made to contact Army OSC (BG Carlson). Not successful.
1445-1555	Various calls are received and made trying to get additional information about accident. Time of crash established as 1704 Zulu.
1610	Clark calls EOC and advises that DOE and LASL contingent are departing for accident site.
1700	LLL and SLL contingent departs for San Jose Airport. DOE/JNACC receives call from Roeder who is at Albuquerque Airport. ETD for Ross flight is 1710 and ETA at Las Vegas is 1940 (MST).

1745 EOC/HQ is advised of initial ARG departure.

1805 DOD/JNACC is informed of IARG departure.

1830 LLL contingent departs San Jose via commercial aircraft for Las Vegas. Notification of departure TWX is issued for T. Clark by DOE/JNACC. DOE/JNACC receives call from EOC and informed of DOD support.

1940 Roeder calls DOE/JNACC from Las Vegas and is advised of DOD support and TWX from HQ.

1945 LLL/SLL initial ARG arrives at McCarran Airport in Las Vegas.

2000 EOC/HQ is advised by DOE/JNACC that ALO and LASL personnel are in Las Vegas.

2153 All members (ALO, LASL, LLL, SLA, SLL) of IARG are in Las Vegas and are enroute to accident scene. EOC/HQ so advised.

2200 DOE/LASL team arrives at Mercury gate. Group delayed about one hour and 15 minutes trying to get badges. Team finally told to proceed to gate 510 to get clearance.

2200-2400 Segments of LLL/SLL team, via various random pathways, arrive at Gate 510, are issued temporary badges, arrive Harvest Eagle, are semi-billeted, no sleeping bags.

2235 DOE/JNACC receives call from J. Roeder concerning badging problem.

2400 DOE/LASL team arrives Harvest Eagle, meet LLL personnel and are assigned tents, cots, blankets, but no sleeping bags.

2325 (PST) Clark, Roeder, Ide and Wechsler make first contact with Col. Don Schwab Fort Ord, NAIC/CAIC team. He provides team with status of accident and tasks accomplished. Clark advises Schwab of DOE/ARG resources.

(2) D+1 Day - 4/19/79
PST

0030 Clark places call from Lathrop Wells to DOE/JNACC and gives verbal SITREP because Army communications are shut down. He requests activation of two MAC SAAM missions (simulated) to move LASL and LLL equipment vans and trailers.

0100 Clark calls EOC/HQ and gives verbal SITREP

0200-0600 Entire DOE/ARG group freeze all night and no one sleeps due to lack of sleeping bags.

0650 DOE/JNACC simulates activation of MAC/SAAM missions and estimates arrival at accident scene at 1200 PST.

0700 Status briefing held for Gen. Carlson by D. Schwab and Capt. Ward, EOD. Attended by DOE/ARG. Rough map of site with major debris and weapon items located as known. Army has already located following:

1 B61 partially buried nose first in ground with fins protruding
1 B43 in fuselage section
1 B61 remmants near crater
1 B43 remmants near crater
1 W70 under wing

Missing Items:
1 W70
2 sets of W33 components

Point of origin of flight, mod and numbers of weapons, etc. still not known. Gen. Carlson specifies the priority of the day is to render the weapons safe. Given copies of initial Army press release which noted that aircraft was carrying classified cargo.

0720 EOC/HQ is advised by DOE/JNACC of MAC/SAAM simulation.

0745 Meeting of DOE/ARG group held.

0900 Briefing held for Gen. Carlson. Clark, Roeder, Wechsler, Ide, Lewis and Murar attend. Each advises Gen. Carlson of his capabilities. Carlson says first priority is RSP for the weapons. Carlson is advised that simulated MAC schedule makes LASL and LLL equipment available at 1200. Decision made to request EG&G aerial photo and radiological survey mission.

0925 DOE/JNACC sends TWX concerning MAC SAAM simulation.

1040 Clark, Ide and Wechsler brief DOE/ARG on current status.

1045 Roeder calls DOE/JNACC from MARS link to request EG&G aerial photography and preliminary off-site radiological monitoring. Also, requests 3 TP documents for use by Lewis, SLA. DOE/JNACC advises of simulated arrival of equipment via MAC aircraft.

1115 Unsuccessful attempt made to get initial DOE personnel over the hot line to assess conditions.

1126 DOE/JNACC contacts EOC and advises them of the support requests and discusses the poor communications with the on-scene personnel.

1230 Status Report:
- RSP completed on the B43
- B61 status not yet determined
- Second 70 still unaccounted for
- Found 3 full and 1 half 33 components near tail section
- Hot spot being set up
- Wing and engine removed from Lance WHS container
- WHS container lifted out of hole in ground
- 4-5 inch deep dent where engine rested on container lid over quick access cover
- Quick access cover removed from container (used force)
- Initial RSP performed on WHS
- Observed command disable T handle missing and indicator pin protruding
- Observed 3 inch x 3/8 inch slit at top front of WHS container
- Some additional small dents noted on front end of container

1300 Army press release announces crash involved high explosives and radioactive material.

1315 Roeder calls DOE/JNACC from Lathrop Wells. Arrival of Jim Appel, SLA, with TP documents confirmed. Advised that no EG&G fixed wing aircraft is available. DOE/JNACC asked to put M&H packaging people on alert.

1320 Clark calls DOE/JNACC vis MARS link and gives status report.

1338 DOE/JNACC relays status report to EOC/HQ.

1400 Information received that origin of flight was Barbers Point and that destination was Sierra Army Depot. Aircraft was diverted to Nellis because of weather and crashed. "Demonstrators" arrived at hot line CP and try to disrupt operations. DOE public affairs representative talks with news media.

1410 Henry, LASL, contacts LASL for NEST meters. Attempts to get Sandia representative (Appel) to transport the gear with the EOD manuals. Henry also to request some similar instruments from EG&G.

1430 Gene Dahout, LLL, has simulated heart attack, departs. Substitute will be Bob Craig.

1445 Clark and Roeder call DOE/JNACC via MARS link. Request two hand held NEST detection instruments from LASL. Request that M&H representative deploy to the scene. Request Mod on "NUWAX-79-70" unit.

1500 Teams consisting of people from LLL, LASL, SLL and SLA cross the hot line. Some team members go to W70 still in shipping case with lid on, lid somewhat damaged. Through access port, it appears to be electrically safe, but also appears to have been disabled (handle gone, indicator pin protruding).
In addition, the following information is obtained:
a) There is a wire and communications problem in the area.
b) Weapons inspection records for both W70's are recovered, one from records tube on remains of H Gear, other from tube on W70 in container. The record says that this system had been "Disabled during Code Change."
c) Extensive alpha contamination noted on ground as well as metal parts.

Other team member determines:
a) Three full W33 components and one half component that were located near the north side of tail section are observed.
b) There is extensive alpha contamination in the area and on the aircraft debris.
c) The Navy EOD team has completed RSP on the B43 located in the central fuselage section and has transported it to the access point.

1515 Roeder calls EG&G directly. Aerial photography confirmed for today.

1536 DOE/JNACC is advised by SLA that "NUWAX-79-70" is a Mod 2.

1615 Clark and Roeder call DOE/JNACC via MARS link and give status report and request simulation of availability of shipping containers. DOE/JNACC advises them of Mod 2 and travel plans for SLA person to hand carry documents and instruments. Arrival of M&H personnel at site is confirmed.

1630 DOE/JNACC advises EOC/HQ of status. DOD/JNACC also advised. EG&G begins aerial photography mission.

1645 Change of command meeting. Army personnel brief Gen. Gardner on status of accident.
Status:
1 B43 safe, ready to ship
1 B61 still buried, safety not known
1 W70 safe
1 B43 detonated
1 B61 detonated
1 W70 component found, believed detonated
2 W33 3 full and 1 half component found

1730 DOE/ARG out of hot area, tired and sweaty. Hot line procedures less than adequate.

1830 DOE/JNACC contacts B. Lemons, M&H, and simulates availability of shipping containers. He indicates containers are available.

1930 On-Scene Commander Staff Meeting:
- Plan daily meeting at 0630 and 1930
- Colonel Grimaud, AF, emphasizes DOE involvement
- DOE participants encouraged to check in with their DOD counterparts

2010 DOE/JNACC contacts EOC/HQ confirming availability of shipping containers.

2110 Roeder contacts DOE/JNACC from Lathrop Wells and gives SITREP. He is informed of availability of shipping containers, new arrival time for SLA person and estimated arrival time for M&H personnel.

2130 Roeder calls EOC/HQ and gives SITREP.
EOD meeting to agree on next day's priorities attended by LASL and LLL personnel.

(3) D+2 - 4/20/79
PST

0630 Morning briefing outlining the day's activities. EOD priorities established.

0650 DOE/JNACC contacts LASL requesting changeout of Smith and Valentine. R. Alexander and B. Lemons, M&H, depart Amarillo for accident site.

0830 Hot line opened.

0900 Air Force press release announces deaths of seven (unidentified) crew members in crash of aircraft that carried six unarmed nuclear weapons. Transfer of on-scene control from Army to Air Force command also announced. DOE public affairs representative participates in actions with press.
Summary of LASL activities as determined by J. Wechsler:
a) Arrangements made for E. Macmann, LASL, to accompany Marine Captain Hayes and Army Lt. Dunkle in W33 component search. Macmann takes a LASL gamma meter and supplies some to the Marines. Meters arrived from Albuquerque last night. Additional similar meters obtained from EG&G.

b) D. Lewis of SLA to accompany AF team to the B61 for RSP attempt.

c) A. Valentine, LASL, to meet with Bio Med Team.

d) Hatler, Luehring, Urizar and Henry to assist at what is believed to be the B43 crater, with Navy team.

e) REECO team at the observer station won't issue needed respirators. LASL borrowing a few from LLL and making arrangements to get some others from REECO.

f) Review the Inspection Record Card for the B61 stuck in the ground. The EOD team had retrieved it. Finally confirmed as a 61 Mod 1.

g) Still no information about cargo manifest.

Summary of LLL activities as determined by R. Ide:

LLL team (Craig, Finger, Martinell, Murar) enter area and observe W70 with lid off shipping case (case had been moved by Army EOD team). Big hole in warhead skin, in weapon skin, and cavity gouged into HE. The HE appears melted at the far end of the hole. Projections of weapon skin curled, folded into weapon and HE.

0930 Alexander and Lemons, M&H, arrive at accident site and begin orientation.

0937 DOE/JNACC receives call from SLA personnel concerning weapon parts identification request which was received directly from field. Provided SLA personnel with MARS link information.

0945 EG&G radiation monitoring helicopter airborne and flies around perimeter of site. Aerial photos taken on 4/19 delivered to DOE/ARG.

1100 EG&G helicopter lands and advises that a "hit" has been made SE of crash site. Spectrum gives initial indication of U-235.

1130 DOD and DOE/ARG advised of above. Decision made to send team into area to determine size of the area and secure the area. A. Valentine to ride in helicopter to make preliminary evaluation from air.

1200 Contamination survey of helicopter done because during hovering it created dust. Results of survey are negative and helicopter released.

1255 Roeder contacts DOE/JNACC via MARS link and gives status report and results of information from EG&G mission. Also gives tentative requirement for third EG&G mission on April 21, 1979.

1300 Summary of LLL activities as determined by R. Ide:

EOD team, with LLL team present, peels back some of the warhead skin around the hole in the W70. Discover protruding end of a metal projectile (1/8" thick by 2" wide) sticking out of the HE, just above the gouged hole. No way to observe, but appears might have damaged tube. One sharp skin projection whisker curls down toward damaged HE.

Two environmental monitoring missions conducted. LLL team collects soil samples just outside the security perimeter. Second LLL team collects soil samples along Highway 95 between Lathrop Wells and Mercury. No samples show anything above background.

1315 Roeder calls DOE/JNACC from Lathrop Wells to give status report.

1330 Macmann, LASL, returns from search with Marines. They have found four more full W33 components. Total now seven plus one half ring.

1355 DOE/JNACC contacts EG&G concerning possible third mission.

1400 Wechsler reviews with Valentine and EOD officer what they saw from helicopter. Valentine and Reed will accompany EOD team to hot spot. Wechsler briefs them on possible parts that might be there.

1400 Clark calls EOC/HQ and gives status report. Call took about one hour to place from Air Force JACC/CP communications center.

1510 DOE/JNACC contacts EOC/HQ and gives status report. EOC/HQ asks when ARG will establish telephone and TWX communications with EOC.

1515 "Mother" of dead crew member visits site near hot line and, in an emotional appearance viewed by news media, criticizes "cover up" and demands to talk to On-Scene Commander. Has discussion with the On-Scene Commander and harasses him for some time.

1530 DOD/DOE team dispatched into area to evaluate and secure contaminated area SE of crash site found by EG&G. Report subsequently received that it is an area about 70x125 feet.

1545 At hot line, Lewis, SLA, reports that the strike enable plug is in place for the B61. This was ascertained after loosening the H gear support and rotating the B61 to uncover access cover. Also, he was able to confirm that the Arm/Safe switch is indeed safe. Strike enable plug was removed and RSP completed. Lewis prevailed upon the team to leave the B61 in place until Wechsler could examine it. This was also reviewed at Command Post with Clark. A crane was used to stabilize the B61 during the digging and RSP procedure.

1600 Report from forward area that the Navy team with LASL people had located the heavy piece of the B43 in the crater where expected. They are bringing it back to access point.

1620 DOE/JNACC calls DOD/JNACC and gives status report.

DOE/JNACC receives 22 AF hard copy of first SITREP from accident site.

1630 Roeder requests third EG&G aerial radiological survey for next day over the crash site directly from EG&G.

-2030 Clark, Ide and other LLL and SLL personnel discuss at length the W70 and the threat to the critical item and the implications.

2015 Most of DOE/ARG attend evening briefing to review day's activities. EOD meeting set up.

1955 During recess before EOD meeting, LLL, Sandia and LASL people discuss radiography of W70.

2040 EOD briefing attended by LASL, Sandia and LLL personnel. Schedule set up for next day's activities, including further exploration of the SE hot spot. Reed, LASL, who had been with the team the day before will accompany Powell, LLL. LLL/SLL/EOD decide to radiograph damaged area of W70 with help of LASL.

2215 LLL, Sandia and LASL personnel review with Tom Clark and EOD about who is keeping log and records. This is a real problem. For example, the Inspection Record Card (IRC) for the B43 went into the contaminated trash. DOE/ARG just barely got the IRC for the B61 from Capt. Morrison before he was scheduled to leave.

(4) D+3 - 4/21/79
PST

0630 Morning briefing outlining day's activities.

0645 Alexander and Lemons meet with DOD and ARG personnel and set up decon and packaging procedures.

0700 Joint LASL/LLL radiography effort of W70 at the accident site begins.

0730 Roeder calls DOE/JNACC from JACC/CP to give status briefing and requests EG&G communications pod for accident site. Roeder advised EOD wants a copy of accident site diagram and location of debris.

0800 Clark leads EOD briefing attended by lab personnel. Much information exchanged. Discussion held regarding possible dispersion of B61 parts.

0820 DOE/JNACC contacts EOC/HQ concerning EG&G communications pod and asks to determine availability.

0900 Team consisting of LLL, LASL and Army EOD radiograph damaged area of W70. LLL and LASL people bring out film for development, examination. Radiograph strongly suggests that fragment cut the tube and that curled whisker from warhead section could be exerting downward force on fragment. Meanwhile, against LLL advice, Army EOD cuts away large section of warhead skin, including the curled whisker pressing down on the fragment. (Suspect that umpire notes them as dead at this point). Team including J. Powell goes to southeast hot spot, and monitors and delineates area estimated at 60 meters wide by 120 meters long (long axis WNW to ESE). Spotty activity up to 12 microcuries per square meter, about 50 times higher than EPA limits for areas accessible by general public.

0930 Roeder and Sabre begin necessary coordination for helicopter flight over accident site. Site to be closed 1200-1400 and all people required to be out during the aerial survey. Restrictions directed by uncertain condition of W70, concern over responsibility of contamination.

1012 Roeder calls DOE/JNACC from Lathrop Wells and is advised of problems concerning availability of EG&G communications pod.

1030 Press briefing held. Air Force announces names of seven fatalities. Ide and Crites of LLL and Valentine of LASL attend and answer news media queries. On-Scene Commander served with injunction issued by Las Vegas District Judge at request of "Cactus Alliance" to halt all operations at the site. DOE public affairs rep participates with news media.

1045 AF Judge Advocate General at site says military will not comply with order and operations will continue. (This decision to continue was subsequently upheld by U.S. Attorney General in Las Vegas and USAF JAG).

1100 Clark, Ide and Wechsler have discussion concerning lack of DOD records and subsequent packaging.

1120 DOE/JNACC receives call from EOC/HQ that EG&G communications pod is unavailable.

1215 EG&G helicopter arrives. Crew given instructions about altitude over crash site and instructions not to hover. Crew delivers additional photos and maps to DOE/ARG.

1245-1330 EG&G helicopter performs survey. Initial data shows an unexplained hot spot near north part of site. Data reported to Clark and DOD personnel.

1345 Ide, Wechsler and other LLL and LASL people discuss fragment in W70. Introduction of air must be avoided.

1400 Meeting of LLL/SLL (Craig, McGuire, Martinell, Murar, Ide) with Army EOD team (Ward, Fullman, etc.) and Gen. Carlson. SLL/LLL develop plan for inert atmosphere via tent and to foam fragment in place. More foam in bottom of weapon case will be necessary to immobilize HE fragments expected to be there. Should top off with dry sand if necessary, and put top on shipping container. Decide to place entire assembly in jet engine shipping container and purge with inert gas and seal for shipment. All concur in plan as being safe and satisfactory. Immobile fragment continues to seal tube. Closed cell foam (CO_2 in cells) would allow only very slow diffusion of air to tube if opened. Moving entire shipping container minimizes stress on weapon. Jet engine container with inert atmosphere provides additional barrier to air. This meeting is pivotal in development of DOE/EOD team relationship, since "one team" relationship established.

1455 DOE/JNACC contacts AL Transportation Safeguards Division (TSD) concerning possible DOE movement of weapons from accident site (simulated).

1525 Roeder calls DOE/JNACC from Lathrop Wells and gives status report. Roeder is advised that EG&G pod is not available, and also that TSD has been contacted.

1600 Initiate procurement of inert gas and equipment to utilize in fix. Use Trolan to set up charter flight from Livermore with two tanks, regulator and tubing to arrive Desert Rock tomorrow at 0730. With Clark, message written to JNACC to require flight. Controllers agree to simulate procurement, say that "Sam Gardner will provide all that we need."

1630 DOE/JNACC receives first hard copy of SITREP from ARG.

1715 DOE/JNACC calls EOC/HQ and gives status report.

1745 LASL team returns from the B61 crater where they have accompanied AF EOD personnel. The team has recovered most of the missing classified parts. Movement of hot line is unsatisfactory resulting in confusion and delays.

1820 Macmann, LASL, returns from Marine EOD search and reports finding one piece of a half W33 component and what appears to be a component of the W70 that detonated in the tail section.

1930 Briefing and summary of day's activities. Highlights include B61 component found in crater, apparent major W70 component found in tail. AF site development team produces grid of accident site developed from DOE aerial photos. DOE personnel express concern about lack of complete inventory of parts.

2100 Clark meets with General Gardner. Decision made to hold meeting 1400 on 4/22 with key personnel to develop overall plan for future accident site activities, including radiological site decon and cleanup.

(5) D+4 - 4/22/79

PST

0630 Briefing concerning day's planned activities is held. TWX has arrived dated April 22, 1979. 0849 ZULU time that a special representative of the SECDEF wants a briefing today at 1700 on (a) the extent of Pu contamination, (b) immediate hazards to public health, (c) measures taken to protect the public from contamination, (d) long-term health hazards and environmental consequences of the contamination. A dry run is scheduled for 1600.

0645-0800 Cylinder of gas requested by LLL arrives. There is no regulator (arrives later) and no tubing. Tubing is supplied from hot spot supplies, decision made to go without regulator.

LLL team go out in own jeep for soil samples in southwest, south, southeast, east sectors outside security perimeter.

0930 Roeder and Sabre make special helicopter flight to Las Vegas to pick up results of EG&G airborne radiological monitoring data and go over data with EG&G technical people.

Wechsler with Navy and AF personnel examine B61 stuck in the ground. Bomb appears in good shape. Wechsler checks access covers for any possible evidence of damaged explosive.

0945 Wechsler gives approval to AF to pull out the B61. Bomb is loose and can be moved by hand.

1000 Ide talks with Jim Olsen at LLL Alert Center and describes entire plan for W70 fix.

LASL and DOD personnel do disciplined search of craters and surrounding areas. Some pieces found may be plated D-38.

1030 AF announces that off-site radiological sampling has produced negative results. Press briefing is attended by "Mayors" of Las Vegas and Lathrop Wells. They are taken to entrance to hot line and talk with On-Scene Commander. DOE public affairs rep participates during press briefing with news media.

1115 Wechsler examines B43 that Navy had put under a tarp. It appears in good shape with no damage to explosive.

1230 LLL/SLL/EOD team out, fix to W70 successfully accomplished. Inert gas tent working very well. Fix performed by EOD members, observed by Craig, McGuire, Murar, Martinell.
Soil samples in range of 1 - 4 miles in southwest - east sector all below backgound of LLL detection (0.05 microcuries per square meter). Water samples from Lathrop Wells all background (alpha, gamma, beta, tritium).

1300 Roeder and Sabre arrive back at crash site with EG&G data which essentially shows no off-site contamination. Data given to T. Clark who gives it to DOD. Data to be used for SECDEF briefing.

1345 Reed and Macmann, LASL, assist M&H personnel in identifying parts and in decon and packaging.

1400 Wind blowing strongly (30-40 knots from south). Soil sampling discontinued. Considerable time spent staking down and saving the tents. Eye irritation severe. Personal belongings almost ruined. Tents are a mess.

1415 DOE/ARG reviews aerial survey data. Wechsler suggests that the SE hot spot may be simulated plutonium particulate scattering from detonated W70.

1600 Dry run for SECDEF briefing. Clark presents DOE data.

1715 Briefing held for SECDEF representative "Jim Wade" (Troy Wade, NVO). Wade appears satisfied and asks for draft outline of cleanup program.

1800 C-rations for dinner.

1930 On-Scene Commander's briefing summarizing the day's activities. Emphasis is on search, discovery, decon and packaging.

2030 M&H personnel meet with EOD teams and review decon and packaging plan.

2230 Ide receives message from LLL (simulated) requesting that entire 70 warhead be radiographed before moving it off-site. With Clark, send response (simulated) describing LLL/SLL actions to date, requesting detailed rationale for more radiography.

(6) D+5 - 4/23/79
PST

0500 - Wind blows all night. Sand is in everything, including cots.
1200 ARG people get little sleep.

0630 Morning briefing and day's priorities established. Advised that play will cease at about 1100 tomorrow.

0739 DOE/JNACC reviews hard copy of second SITREP from ARG.

0800 Discuss concept of additional radiography for W70. Agree that there is no clear technical reason for more radiography. However, concede that complete radiography of any nuclear weapon that has received harsh treatment is probably a good idea. SLL/LLL team (Craig, McGuire, Martinell, Murar) go out on search and discover mission with Army EOD.

Wilson, Langly, LLL go out on dirt sampling mission (northern sector); Ide sets up logistics for extended radiography with LASL and Col. Grimaud.

0800-1830 M&H personnel, together with four LASL people and several Seal Beach, CA people perform packaging of weapons components.

0819 DOE/JNACC receives second hard copy of SITREP from 22AF.

0831 DOE/JNACC receives third hard copy of SITREP from ARG.

0848 DOE/JNACC receives third hard copy of SITREP from 22AF.

0913 Roeder calls DOE/JNACC from Lathrop Wells and gives status report. TSD simulation discontinued.

0936 DOE/JNACC receives fourth hard copy of SITREP from 22AF.

1000 Still no response to LLL ARG request for detailed rationale from "LLL/HQ" concerning radiography of W-70. Resolve to proceed anyway. Message to that effect goes out to LLL (simulated).

1030 Wechsler and Lawrence, LASL, attend press briefing and answer media questions. AF announces that two Army military policemen have been killed during an attempt by four persons to penetrate the accident site (simulated). A Nye county deputy sheriff arrives to present a bench warrant to the On-Scene Commander. After talking to U.S. Attorney in Las Vegas by phone, he leaves without serving the warrant. DOE public affairs rep is interviewed by news media and participates during briefing. News media advised that a representative of the Secretary of Defense visited accident scene and then returned to Washington, DC.

1100 LLL/EOD team defers radiography until after lunch.

1230 Ide receives message via Col. Grimaud from LLL/HQ (simulated) with rationale for radiography.

1500-1800 LASL team under direction of LLL takes 6 exposures, 7 films covering W70. Observe strange object at approximately same height as first fragment, but further forward in weapon. Also some lack of symmetry at far forward end, suggestion of a discontinuity near forward end. Will study, interpret tommorrow.

1930 General briefing. Found contaminated waste near spectator bleachers of drums and glass carboys. Approximately 25 mr/hr gamma. This is area also found by EG&G. Directed to look there by contours of ARMS-generated surface activity map. General Tate believes is not left by Controllers during site preparation. LLL agrees to sample and do pulse height analysis tomorrow.

(7) D+6, 4/24/79
PST

0630 Briefing concerning day's planned activities is held. It is emphasized that adequate hot line coverage is still needed. Exercise is to end about 1100 today.

0655 DOE/JNACC receives fifth hard copy of 22nd AF SITREP.

0700 - 1100 General Cody advises LLL that contaminated waste was left from the spreading of the Ra-223 contamination. No further action necessary. Mason and Hanger personnel continue decon and packaging, assisted by LLL and Marine personnel.

LLL/SLL personnel review radiography of W-70 and observe fragment forward of first. Conclude it struck the HE and then rebounded forward and that it poses no threat.

0800 Wechsler and LASL personnel are at hot line. ECS asks LASL personnel to do search for the six missing tuballoy pieces to demonstrate LASL ability.

0819 DOE/JNACC receives fourth hard copy of SITREP from ARG.

0900 LASL personnel, led by Wechsler, go through the hot line and, using meters, begin sweep of area, heading north from tail section. Eventually joined by AF, Marine and surveyor personnel. Succeed in locating four of the six pieces.

1030 Exercise terminated.

1130 Above team leaves. Wechsler suggests that other pieces may be under wreckage.

1230 M&H personnel close out decon and packaging operation.

1230-1645 Critique held at NRDS.

d. DOE Accident Response Group

(1) The mission of the DOE Accident Response Group (ARG) is: To provide the DOD On-Scene Commander at the accident site expertise in the scientific and technical aspects of all nuclear weapons involved in the accident. This includes advising and assisting the On-Scene Commander in the evaluation and control of the post-accident environment hazards and determination of counter-measures such as: advice and assistance in the delineation of the hazard area; accomplishment of rendering safe procedures; identifying nuclear weapon design information and restricted data; collection and identification of weapon debris; cleanup operations; the preparation of debris for disposal or shipment; and public information policy. To provide support to the On-Scene Commander in discussions with foreign or local government officials on matters within areas of special DOE competence. To collect and correlate accident information received from the DOD and to develop a chronological history of the accident, weapons damage, DOE response operations, and post-accident operations.

(2) Size.

(a) The initial DOE/ARG Response Team was composed of a DOE Representative, Support Coordinator, a Public Information Representative, a Security and

Classification Representative, a Senior Scientific Advisor from LASL, a Senior Scientific Advisor from LLL, eight other personnel from LASL, seven others from LLL, one from SLA and two from SLL.

(b) In addition, Military Airlift Command (MAC) transported two LLL and one LASL truck and trailer units with the drivers that were brought into exercise play on D+1. This increased the LASL personnel to 12 and LLL personnel to 13. Two Mason and Hanger, Silas Mason Company, Inc., packaging specialists were requested and arrived at the scene on D+2. The total DOE/ARG strength from D+2 through the exercise conclusion remained at 34, although replacement rotation continued throughout the exercise.

(3) Equipment.

(a) By the end of D+1, LASL had the following equipment available for use: alpha and gamma monitoring equipment; differentiating gamma search instruments; and portable high resolution radiographic capability with film processing and viewing equipment contained in the Q-2 van and trailer. When the LLL hot spot response vans and trailers were put into play on D+1, the following equipment and capabilities were available: a full radiological analytical lab with gamma pulse height analyzer and various gamma scintillation detectors, beta counters, alpha counters and tritium detector; a mobile decontamination facility with personnel monitors, anti-contamination clothing respirators and hot shower; alpha and gamma monitors; miscellaneous equipment required to make these capabilities self-sustaining; and the Atmospheric Release Advisory Capability (ARAC) used to determine the disposition of off-site aerial contamination. LLL's home base ARAC was activated on D-day and operated throughout the exercise.

(b) The DOE arranged for EG&G support which included aerial photography on D+1, an off-site aerial radiological survey on D+2 and an aerial radiological survey over the crash site on D+3.

(4) Activities. The activities in which the DOE/ARG was requested to participate included technical assistance in rendering safe procedures, identification of weapon debris, component search activities, movement of damaged weapons and parts, preparation of debris for disposal or shipment, Pu information activities, off-site and on-site environmental monitoring (air, soil and water), participant bioassay sample analysis (nose swipes, urine samples), and coordinating activities with the various DOE elements involved. Laboratory disciplines utilized in accomplishing these activities included: Radiation Detection and Diagnostic Specialists, Weapons Design Specialists, Arming and Firing Specialists, Health Physicists, High Explosives Specialists, Criticality Specialists, ARAC Specialists and Packaging and Transportation Specialists.

ORGANIZATION CHART
DEPARTMENT OF ENERGY
ACCIDENT RESPONSE GROUP

DOE/JNACC — DEPARTMENT OF ENERGY

LOS ALAMOS SCIENTIFIC LABORATORY — SANDIA LABORATORIES ALBUQUERQUE

LAWRENCE LIVERMORE LABORATORY — SANDIA LABORATORIES LIVERMORE

MASON & HANGER SILAS MASON CO., INC. — EG&G, INC.

Participants listed on the following pages.

DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE

Thomas R. Clark	DOE Representative
Jack R. Roeder	Support Coordinator
George Dennis	Public Information Representative
Randolph E. Sabre	Security Representative

DEPARTMENT OF ENERGY
JOINT NUCLEAR ACCIDENT COORDINATING CENTER

John H. Douglas	Operations Coordinator
Jack F. Williams	Operations Coordinator

LOS ALAMOS SCIENTIFIC LABORATORY

Jacob J. Wechsler	Senior Scientific Advisor
John M. Bieri	Radiation Detection & Diagnostic Specialist
Stephen W. France	Radiation Detection & Diagnostic Specialist
Ray D. Hastings	Radiation Detection & Diagnostic Specialist
Larry E. Hatler	High Explosive Specialist
Carl N. Henry	Radiation Detection & Diagnostic Specialist
Lester Luehring	High Explosive Specialist
James N. P. Lawrence	Health Physicist
Edward N. Macmann	Weapons Design Specialist
Thomas P. McLaughlin	Criticality Specialist
Clyde H. Reed	Radiation Detection & Diagnostic Specialist
David R. Smith	Criticality Specialist
Manuel J. Urizar	High Explosive Specialist
Allen M. Valentine	Health Physicist

LAWRENCE LIVERMORE LABORATORY

Roger H. Ide	Senior Scientific Advisor
Arthur L. Anderson	Hot Spot Technician
Donald G. Beason	Hot Spot Technician
George W. Campbell	Hot Spot Technician
John Clatworthy	Field Coordinator
Robert J. Craig	Weapons Design Specialist
Thomas R. Crites	Criticality Specialist
Eugene Dahout	Weapons Design Specialist
Milton Finger	High Explosive Specialist
Thomas A. Gibson	Health Physicist
George Greenly	ARAC Specialist

Darrel L. Hallock	Hot Spot Technician
Gerald Hunt	Hot Spot Technician
Kerr E. MacBain	Hot Spot Technician
Edward J. Leahy	Health Physicist
Raymond R. McGuire	High Explosive Specialist
Fredrick M. McMillen	Hot Spot Technician
T. Jordan Powell	Criticality Specialist
Robert A. Simpson	Hot Spot Technician
Nathan H. Steel	Hot Spot Technician
Thomas J. Sullivan	ARAC Specialist
Carl W. Sundbeck	Hot Spot Technician
Rice T. Trolan	Field Coordinator
Ross L. Wilson	Health Physicist

SANDIA LABORATORIES - ALBUQUERQUE

Donald R. Lewis	Arming & Firing Specialist

SANDIA LABORATORIES - LIVERMORE

Ronald E. Martinell	Arming & Firing Specialist
Frank J. Murar	Arming & Firing Specialist

MASON & HANGER - SILAS MASON CO., INC.

Ronald E. Alexander	Packaging Specialist
Bobby D. Lemons	Packaging Specialist

EG&G

Leo Arambula	Technician
Jose Cordova	Technician
Thane Hendricks	Data Scientist
Bob Ingalls	Pilot
Tim McCreary	Photographer
Don Nail	Pilot
Doug Smith	Data Scientist
John Tipton	Scientist
Rex Windom	Photographer

Note: EG&G helicopter support provided by Det. 1, 57th Fighter Weapons Wing, USAF, Indian Springs Auxiliary Airfield.

e. Overall Support and Preparatory Support

(1) The DOD logistical, administrative and communications support for the DOE players was a disappointment. Aside from tents, cots and a few blankets, the players had to make do with what they had. The food was good and plentiful. When the On-Scene Commander recognized a major administrative or logistical problem, he did what he could to remedy the situation, but his resources were severely limited.

(2) Transportation was critically short for the DOD throughout the exercise. DOE had to use self-provided transportation (rental cars or lab NTS cars) to get to the accident site initially.

(3) The Chief of the Air Force Security Police was the best source of equipment support in some cases. He promptly recognized the dilemma of the DOE players and, when asked, produced one jeep and three hand-held radios from within his seriously limited resources. Prior to receiving the radios, internal communications among DOE representatives and the Senior Scientific Advisors were nearly impossible.

(4) DOE desperately needed a fully staffed and functioning CP throughout the exercise. Four attempts were made to establish an adequate CP. All failed, for various reasons. Lack of an adequate CP facility hampered DOE coordination and information flow.

(5) Limitations in both external and internal communications severely hampered the DOE players. For internal communications, they were twice provided telephone handsets. The one located in the CP near the hot line control point on D+1 never worked properly. The one provided about D+4 in the CP in the administrative area worked reasonably well for internal site communications; however, we were not organized to staff the CP, and it got relatively little use.

(6) External communications were generally poor. Lack of land-line communications made situations more difficult since the DOE players were generally unfamiliar with use of radio links. Except for the Army MARS link through Fort Ord, radio phone patch communications to non-AUTOVON phones (such as FTS or commercial numbers common to DOE locations) was nearly impossible. Our best off-site communication link was by commercial telephone from the pay phone at the "Watering Hole," a bar and truck stop in Lathrop Wells, about 7 miles from the accident site.

(7) After struggling with inadequate communications for several days, the DOE/ARG requested the DOE NEST communications package in an effort to achieve an adequate external communications capability. Denial of that request was both a surprise and a disappointment.

(8) Lack of DOE internal administrative capability added to the other problems. While DOD administrative people were willing to provide help, they were overloaded with their own work. Consequently, DOE players used the telephone, to the extent possible, in preference to teletype. As a result, such message traffic that should have appeared in exercise play was never generated. The DOE Representative, in order to relieve the administrative burden on the Air Force CP staff and speed up dispatch, resorted to writing all messages (including daily SITREPs) by hand, directly on the message forms, and dispatching them.

(9) Prior to the exercise, DOE key player personnel were advised that DOE would not be permitted to use its own emergency response radio equipment and radiological assistance net frequencies because they had been preempted by the Exercise Control Staff. This preemption exacerbated the severe internal communications problems encountered by the DOE/ARG.

f. Comments on Overall Conduct of Exercise

(1) Overall, the exercise was excellently planned and carried out. The exercise demonstrated that the DOD and DOE can work together to evaluate and mitigate the consequences of a serious accident. The comments which follow are provided for consideration in the planning of future exercises and intended to be constructive in nature.

(2) Exercises are viewed differently by the DOD and DOE. The DOD participates in many exercises and its approach is to try to guess the approved solution and complete the exercise as soon as possible. The DOE participants, who engage in few exercises, try to operate as they would in a real-world situation.

(3) In this exercise, the objectives were not easily detectable by the military players; hence, some were overlooked during the early stages. For example, priority was given to the EOD requirements; i.e., render safe, turn the recovered weapons over to the DOE as quickly as possible, and find and return the scattered weapon parts. As a result, not much thought was given initially by the DOD to the broader objectives, at least in the early stages of the exercise. Consequently, an overall evaluation of the accident situation, an overall management plan, the radiological assessment of off-site contamination in terms of public health and safety, packaging and transportation, and long-term site decontamination were not properly analyzed and planned. DOE, together with the DOD, made a belated effort to initiate such planning, but this effort was frustrated by other high priority problems and the relatively short length of the exercise. As previously noted, EOD teams are trained that render safe of all weapons is first priority. Having achieved initial render safe, the almost universal next step by the EOD teams was to move the weapon

from the wreckage, a practice unacceptable to the DOE. There appears to be no logic for such action, particularly when one recognizes that the procedures are really initial ones only and that additional actions may be needed to complete RSP. There are many reasons for leaving the weapon alone after initial RSP, including damage assessment, conducting other priority tasks, possible destruction of evidence which might be useful in other accident analysis, and most important, safety.

(4) Further, some of the EOD teams were picking up items from the debris without adequate logging of location and orientation. This information would have been useful in locating other parts. Although the EOD teams were well versed in RSP, they did not appear to have reasonable search and recovery procedures. Some teams went out on search and recovery sorties without radiation survey equipment, and consequently could have been operating for extended periods in hazardous circumstances, as well as not detecting the radiation from weapon parts.

(5) The DOE players suffered from a lack of appreciation for the limitations and requirements of exercise play and tried to operate as they would have in a real-world situation. For example, when a specific item of equipment was needed, the DOE participants (already frustrated by poor communications) called directly to their home offices and arranged for delivery of the equipment by special transportation. In two instances (special gamma-detection meters from EG&G and LASL, and inert gas cylinders and regulators from LLL), the requests did get into exercise channels, but only after some turmoil. Further, the DOE tendency to make telephone requests (as would be the real-world case) in preference to message requests probably left many undocumented gaps in the exercise record. Some examples:

(a) The request for three aerial support missions by EG&G (photo) (radiological survey outside the area, and the survey inside the area) was made by phone on the morning of D+1 to DOE/JNACC. All subsequent arrangements for flights were made by phone directly to EG&G. The results of these support missions were all hand-carried and never properly transmitted.

(b) The request for MAC/SAAM missions to move the LASL van and trailer and the LLL hot spot equipment to the site were made by phone to DOE/JNACC shortly after midnight of D-day. No TWX confirmation could be made.

(c) The request to bring EOD manuals from SLA and later arrangements to bring LASL gamma meters were handled entirely by phone, partly through DOE/JNACC, without TWX confirmation.

(d) The request for the EG&G communications pod for support of the DOE element was made by phone to the EOC/HQ without TWX confirmation.

(e) The telephone request from the EOC/HQ for a plot of the accident site was accommodated by use of LLL telefax equipment from a pay phone in Lathrop Wells.

Items (d) & (e) were at least alluded to in DOE SITREPs, but were not supported by any formal exercise message traffic. Lack of DOE on-site administrative capability (for message preparation and handling), frustration with slow and imperfect communications and lack of understanding by DOE players for the exercise control implications of telephone (versus message) requests all contributed in the examples listed above. The actions were taken as they would have been in a real-world situation. The question remains--did the Exercise Control Staff know in a timely way of these actions? If not, did that absence of information prompt the ECS to take actions it would not have if it had known?

(6) In future exercises, umpires, observers and controllers should try to limit their discussions with player personnel. Such discussions tended to detract from the "real world" atmosphere in which most of the players were engrossed, and in some cases interfered with the play.

(7) Finally, for future exercises consideration should be given to lengthening the exercise play and/or not informing the players as to when the exercise is to end. There is no doubt that the time limitation affected management decisions and player actions.

g. Conclusions.

(1) NUWAX-79 was a success and the overall rating is EXCELLENT. All participating agencies learned many lessons.

(2) The exercise was over-structured in some respects.

(a) Exercise play was nominally limited from 0800 to 1800 hours daily. This constraint precluded dawn-to-dusk operations in the hot line which might have resulted in more effective use of personnel.

(b) Pre-allocation of MAC/SAAM flights.

(c) Lack of availability of DOD aerial photography.

(d) Limited communications.

(3) Too much information was made known to players in advance of exercise; e.g.:

(a) Types of weapons involved.

(b) Date and time of exercise initiation.

(c) Date and time of exercise termination.

(4) It was demonstrated that DOE and DOD organizations can work together successfully in response to a weapons accident. However, under current arrangements, development of appropriate relationships takes considerable time.

(5) The Memorandum of Understanding between the DOD and the DOE (ERDA) concerning accidents involving nuclear weapons in the custody of the DOD is outdated and in need of revision.

(6) The communications were less than adequate and the DOE could not rely on the DOD communications.

(7) The DOD administrative support such as housing, bedding, post support and other services were less than adequate. Storage of classified documents was a problem, as was the visual identification of DOE personnel by DOD people.

(8) DOE did not initially have a command post, and when it was established, it was less than adequate.

(9) The composition of the DOE/ARG needs to be reviewed.

(10) The relative roles and responsibilities of DOE's EOC/HQ and DOE/JNACC need clarification.

(11) DOE (ERDA) Manual Chapter (MC) 0527 is outdated and in need of revision.

(12) Aerial photography and aerial off-site monitoring should have been more timely. High resolution aerial photography was non-existent.

(13) Pre-accident coordination among DOE participating agencies regarding equipment, resources, etc. was less than adequate.

(14) The DOD/DOE did not establish an overall plan for managing the accident.

(15) Initial communications between DOE and DOD senior participants and specialists were less than adequate.

(16) The regular meetings which were held tended to emphasize daily status and plans for the following day. Regularly scheduled planning meetings

with DOD and DOE senior personnel to develop and assess management plans for the accident response were virtually non-existent.

(17) There was a lack of coordination of all the resources at the disposal of the DOD and the DOE; e.g., radiation monitoring, weather data, air and soil sampling, etc.

(18) In some instances, exchange of data and information acquired by both the DOD and DOE during the exercise was less than adequate. Grid markers of the area were non-existent.

(19) EOD manuals were not available to DOE personnel and had to be flown to the site by special courier.

(20) Reference type radiographs of the W-70 would have helped in the damage assessment.

(21) Although the EOD teams were well versed in render-safe procedures, they did not appear to have reasonable search and recovery procedures.

(22) There were inconsistencies between the Army and Air Force regarding hot line procedures and techniques and there were deficiencies in both.

(23) Some of DOD's radiation protection equipment and instrumentation appeared outdated and unreliable.

(24) The high priority given by DOD to hot line entry point operations resulted in delay of ground radiation survey until very late in the exercise.

(25) There are no standard containers for packaging large amounts of debris and residue.

(26) The DOD's present policies and requirements regarding public affairs are less than adequate.

(27) There was inadequate time for the pla[illegible] to prepare for the verbal critique, and the critique was too long, particularly for very tired players.

(28) The proposed DOE format for SITREPs is too structured.

h. Lessons Learned and Recommendations:

(1) Plans for NUWAX-81 should continue and the DOE should support such an exercise. Future exercises should be less structured and a minimum of pre-information should be made known to the players. More free play by the players should be allowed.

(2) The Memorandum of Understanding between the DOD and the DOE concerning accidents involving nuclear weapons in the custody of the DOD should be reviewed and evaluated. Consideration should be given to better defining the role of the DOE and its considerable resources, many of which are unknown to the DOD. Consideration should also be given to designating the DOE Representative as Technical Deputy to the On-Scene Commander, with appropriate authority for the technical weapons aspects of the operations.

(3) As part of the ARG, DOE should have its own communications network, including, but not limited to, telephones, radio, TWX facilities, portable dictating machines and extra tapes, two-way radios for use by DOE personnel, and duplicating equipment. Establishment of commercial telephone service should be an early, high-priority requirement.

(4) The ARG should provide some basic support for itself without dependence on the DOD. It should include, but not be limited to, sleeping bags, blankets, warm clothing, foul weather gear, eye protection, etc. A small safe for storage of classified documents should also be included. There should be prominent identification for each person, such as a cap which identifies his function; e.g., "DOE Representative," "LASL Sr. Scientific Advisor," "LLL Weapons Design Specialist," etc.

(5) Immediately upon arrival at the accident site, DOE should establish a command post. This command post should be weather-resistant and should have

telephones, tables, chairs, etc. and administrative conveniences. Consideration should be given to a portable trailer.

(6) The composition of the DOE/ARG group should be examined and expanded as follows: (a) the DOE Representative needs an expanded administrative and logistical support staff, and (b) a senior EG&G person should be part of the initial DOE/ARG. DOE(ERDA) MC 0527 should be modified to reflect this change.

(7) The relative roles and reponsibilities of DOE's HQ/EOC and DOE/JNACC should be reexamined and clarified. If the DOE/JNACC is to continue its present responsibilities, it needs better facilities, improved communications (including a direct AUTOVON line) and more trained personnel.

(8) DOE(ERDA) MC 0527 should be revised and updated as soon as possible.

(9) Immediately upon confirmation of a Broken Arrow, the EG&G Aerial Radiological Survey and Photographic capabilities should be dispatched to the airport nearest to the accident scene and told to stand by. EG&G should be prepared to conduct high-resolution aerial photography of the scene, and/or evaluation of the off-site contamination and potential risks to the general public.

(10) The DOE should establish an ARG coordinating committee with representatives from participating organizations. This group should assist in revision of DOE (ERDA) MC 0527 and in the preplanning of future ARG activities.

(11) As soon as possible after evaluation of the accident scene, an overall management plan should be developed by the DOD (with the assistance of the DOE), which should identify all the action items. (This plan would be in addition to the daily action plan.)

(12) As soon as possible, the DOE senior participants and specialists should seek out and introduce themselves to senior DOD personnel. As soon as

possible, DOE specialists should start discussions with the DOD personnel in charge of the areas of their specialty.

(13) The DOE Representative and the Senior Scientific Advisors should meet regularly, and often, with the On-Scene Commander and his senior staff to set priorities and develop a general plan of action. Regularly-scheduled (end of the day at same time) meetings of the participants in each major area of effort (EOD, radiological survey, decon, public relations, etc.,) should be held, as should meetings of DOE personnel.

(14) The On-Scene Commander, with the help of the DOE Representative, should ensure coordination of all resources at his disposal in each area of the work at hand. The DOE and the DOD should each name one contact point for each specific area of concern, and this pair of individuals would respond and report to the top level "steering group," consisting of the On-Scene Commander and his top aides, the DOE Representative and the DOE Senior Scientific Advisor(s).

(15) There should be a specific location where the detailed data concerning the progress of each area of effort is continually accumulated, recorded, placed in context with existing data, and made available for easy assimilation. In addition, a field-deployable grid marker system should be used--perhaps involving a large number of tall stakes with numbers or letters visible on the ground from distances of at least 100 feet, and also visible from the air in high resolution photography. This should be deployed very early, and all activity and items in the area could easily be described as to location relative to such markers.

(16) The EOD manuals should be brought to the scene by Sandia personnel during the initial response. These manuals are extremely useful with respect to hardware location and monitoring features, as well as details of shipping configurations as differentiated from actual weapon geometry.

(17) DOE Laboratories should have available radiographs of all weapons in the stockpile for reference points. The radiographs should be conducted using the same type of radiography techniques that would be used in the field.

(18) EOD teams should receive further training in search and recovery operations, emphasizing proper logging and orientation of items and adequate radiation monitoring, and DOE personnel should accompany these teams during search and recovery.

(19) All DOD procedural and technical aspects of hot line operations should be reviewed for consistency and adequacy and revised and updated as necessary.

(20) The DOD's radiation protection equipment and instrumentation should be evaluated and brought up to the state-of-the-art.

(21) DOD priorities for Rad Safe activities should be reviewed to ensure that ground radiation contamination surveys are conducted in a timely way.

(22) Standard containers for packaging large amounts of debris and residue need to be identified and a method of acquiring these containers needs to be determined.

(23) The DOD should review its present policies and requirements regarding public affairs and the use of pre-prepared news releases, and make changes accordingly. Some specific areas for improvement are as follows:

(a) Because of very restrictive Army regulations and the use of pre-prepared news releases, the Army was unable to confirm the presence of radiation/contamination, although news media representatives could observe Anti-C, respirator and instrument-equipped monitors a few feet away.

(b) A posture of "openness" should be adopted and a policy of prompt and factual reporting observed.

(c) News media briefings should be conducted at least twice a day, having technical experts available who can talk in simple, nontechnical language.

(d) If fatalities are involved, supply identification and other basic personal information as soon as possible, regardless of whether the bodies are removed.

(e) As soon as possible, confirm the existence of all site monitoring efforts. Provide the results as soon as possible in understandable terms.

(f) Establish contact with local, county, and state officials and arrange for their visits to the site.

(24) For future exercises, the critique should be held the next day at a nearby city after the players have had adequate time to prepare for the critique and recover from the exercise.

(25) The proposed DOE format for SITREPs should be reviewed and modified. The present format appears to be too structured.

2. ARMY: The following is the Army After Action Report in its entirety.

1. SCENARIO.

a. Clarity: The nuclear weapons accident situation set forth clearly in the basic scenario was reinforced in subsequent FCDNA and USASIX pre-exercise briefings.

b. Realism: Short of an actual accident, NUWAX 79 gave us the best possible appreciation of the scope, the complexity and seriousness of this kind of operation. Understanding that this exercise was the first of its kind ever conducted, the realism portrayed was certainly adequate. There were, however, areas of problem play worthy of mention which detracted from the realism of the exercise and should be avoided/resolved during the conduct of future exercises where feasible.

(1) Harvest Eagle: The critical logistical problem of housing and subsistence support provided by the Harvest Eagle package was not tested and therefore remains unresolved.

(2) NTS Safety, Security and Contractual Obligations: The employment of immediate measures for the fixing of contamination were not readily permitted. In addition, much of the task force protective clothing and equipment were not permitted in the contamination area and resulted in an unaccustomed artificiality which detracted from the scenario realism. We do not mean to sacrifice safety and security of actors, players and controller personnel, but we feel that a task force must be granted the opportunity to gain confidence and experience by using organic task force equipment. The cost of such action would be appreciably higher, however, we feel that it is money well invested. REECO contractual obligation restricted the use of task force vehicles in the

contaminated area and also governed the time period (i.e., fixed hours) in which REECO personnel and equipment could be utilized. Many daylight hours met with inactivity in the contaminated area due to the nonavailability of REECO personnel and NTS safety requirements. These restrictions are unrealistic and should be avoided where possible.

(3) Higher Headquarters: There was not enough play directed/permitted by higher headquarters. This condition detracted from the realism as it removed a significant check and balance system from the conduct of emergency response operations. Involvement of higher headquarters in future exercise play is essential.

(4) Requested Assistance and Support: The most noteworthy assistance and support request which went unresolved was the requests for commercial phone communications and aerial photos. It is unrealistic to expect that a lieutenant at Fort Ord commanding an infantry company on routine training can request and receive photo coverage, yet a BG involved in a nuclear emergency cannot get the same response. Also, it has been this command's experience that commercial phone communications are routinely provided during JCS operations yet during this exercise such communications were denied. The lack of such communications placed an unrealistic burden on alternate communications capabilities of the task force and hindered the task force's ability for timeliness.

(5) Civilian Agencies: From the outset of the exercise, plans were made by the task force to support emergency response operations with local, state and federal agencies to handle present and/or anticipated

problems. The artificiality involved in assuming the presence/nonpresence of these personnel was unrealistic and should be avoided if possible. For example, the task force required the services of the local coroner's office yet the assistance of the local sheriff to acquire such services (which he is readily familiar with) was not permitted. As a result, an additional burden was placed on another section of the task force to acquire such services.

c. Adequacy: As a first step towards integrated training for U.S. nuclear response capability within the continental U.S., NUWAX 79 proved to be a realistic training vehicle for DOD and DOE nuclear response organizations. In future exercises, attention should be given to permit the play and/or additional play of the following:

(1) Mortuary services.

(2) Accident Investigation Board.

(3) Medical response to contaminated casualty processing.

(4) Higher headquarters.

(5) Contamination control operations.

(6) Civilian agencies.

In order to exercise many of these areas, the safety and security restrictions encountered at the Nevada Test Site must be avoided where possible as they seemed to adversely affect scenario realism and limit scenario adequacy. For example, the fixing of the spread of contamination is a critical responsibility of the On-Scene Commander as was learned during the Palomares operation; however, that responsibility was inadequately tested during NUWAX.

d. Site Location: The site location was perfect in terms of terrain offered and its remoteness. However, the restrictions imposed by the Nevada Test Site such as use of roads, equipment and prepositioned facilities did not serve to enhance the scenario and therefore should be avoided during future exercises.

2. USE OF IMPLEMENTERS. The use of implementers during the exercise was timely, understandable and adequate. The use of simulation, however, should be used sparingly to permit maximum participation in problem play of all feasible requested support. Implementers providing engineering expertise should also be included in the problem play to adequately test the capabilities of the task force engineer representative.

3. EXERCISE NARRATIVE OF EVENTS WHICH TRANSPIRED. See Table I, page 161.

4. ACCIDENT RESPONSE FORCE ORGANIZATION.

a. Title: Department of Army Fort Ord NCAIC Task Force.

b. Mission: Take necessary actions to save lives by minimizing injury and loss of life; reduce hazards by controlling contamination and decontaminating the accident site; secure, protect, salvage, and account for classified government property; and maintain public confidence in the ability of the US Army to respond to a nuclear accident/incident within the states of CA, OR, WA, ID, MT, UT, NV, and AZ.

c. Size: The Fort Ord NCAIC Task Force is manned as listed below. EOD is included; however, they are generally not directly controlled by the Commander, Fort Ord.

	Off	NCO	EP
Command and Control Element	11	3	3
EOD	2	2	8
Medical Team	1	1	4
Physical Security Team	1	1	23
NBC Alpha Team	1	2	12
Communications Team	1	1	8
PAO Team	2	-	1
Legal Team	1	-	1
Support Team	1	2	17
Aviation Team	4	-	2
Engineer Team	1	-	-
Subtotals	26	12	79

TOTAL: 117

NOTE: Aviation assets are determined through analysis of response requirements.

d. Equipment:

(1) Vehicular Capability: The entire task force is mobile utilizing the organic assets listed below. Again, EOD is included.

	Vehicles
Command and Control Element	1 Blazer ½-ton, 1 Carryall ½-ton
EOD	2 M-880's
Medical Team	1 Ambulance 5/4-ton
Physical Security Team	5-¼-ton trucks, 3-¼-ton trailers
NBC Alpha Team	1 Panel Truck, ½-ton; 1 Carryall, ½-ton
Communications Team	2 M882/RATT w/trailer; 2 Carryalls, ½-ton
PAO Team	1 Panel Truck, ½-ton
Legal Team	1 Blazer, ½-ton
Support Team	4 2½-ton trucks, 1-water trailer, 1 1½-ton trailer w/2 5-KW generators
Aviation*	2 UH-1

TOTAL: 20 Vehicles, 7 Trailers, 2 Helicopters

*Note: Aviation assets to be determined through analysis of response requirements.

(2) Mission Peculiar Equipment: Basic supplies and equipment in sufficient quantities to maintain operations without support for a period of 72 hours.

(a) Tentage sufficient to establish a command post, communications center, briefing area, military police checkpoint, support facility, and accommodations for the On-Scene Commander. Individual task force member carries shelter half as a part of his personal deployment gear.

(b) Communications equipment to establish an internal land line net to 15 key personnel by means of TA 312 PT and switchboard, hand-held portable AM radio net capable of accommodating a net control station and 14 extensions, FM vehicular-mounted and portable radio capability extending to 12 net participants the means of transmitting up to 10 miles.

(c) Medical supplies and equipment to handle emergency medical treatment for at least twenty patients to include evacuation capability.

(d) Weapons and ammunition to provide small arms weapons coverage up to a maximum effective range of 350 meters by 24 security personnel.

(e) Protective clothing and equipment to accommodate 60 task force personnel.

(f) Radiological monitoring/decontaminating equipment to include 8 AN/PDR-60s, 12 AN/PDR-27s and 6 STAPLEXs. First echelon maintenance capability is also available.

(g) General support which includes expendable supplies, rations, latrine facilities, generators to sustain 24-hours-a-day power supply, hot water heaters, cold weather clothing, maintenance tools and limited repair parts capability.

e. Activities: Generally the task force, by element, provides the following response capabilities.

(1) Command and Control Element: Command and control directives, coordination of operations, and assistance/advice in the areas of aviation, logistics, engineer, public affairs, religious and legal matters.

(2) NBC Alpha Team: Hot line operations, personnel processing, radiological survey, and area decontamination.

(3) Communications Team: Establish communications with Fort Ord and maintain internal task force communications.

(4) Medical Team: Emergency medical care, man hot line, man medical desk, and maintain task force exposure records.

(5) Support Team: Convoy control, tent erection, administrative support, rations, etc.

(6) Security Team: Area security, personnel control, and interface with local law officials.

(7) EOD (upon attachment): Initial emergency medical care and render safe any weapons involved.

f. Organizational Chart: See Figure 1, page 171.

5. OVERALL SUPPORT FROM DOD AND DOE RESOURCES. The overall support provided by DOD and DOE resources were more than adequate while complementing and supplementing the Fort Ord NCAIC Task Force.

a. DOD:

(1) The EOD teams provided by the Air Force, Navy and Marines performed their duties in an excellent manner. Most noteworthy was their ability to maintain communications control, providing an accurate account

of personnel and equipment resources downrange. Their superb communications control was again evident during render safe procedures.

(2) The success of rapid and effective logistics support was made possible by Nellis AFB, and in particular LTC Novak. The exercise generated many specialized logistic problems not normally encountered. The priority assigned was appropriate to a national emergency which, in some respects, this represented.

(3) The Fort Ord Emergency Operation Center provided a MARS station for telephone connection to the accident site. On D+1 communications retransmissions were established and implemented and continued to operate satisfactorily throughout the exercise.

(4) USASIX: This headquarters, although supportive, was provided little opportunity to actively participate during the exercise. This condition detracted from realistic play and allowed this very important function to go untested.

(5) DOE: From the onset of the exercise, plans were made to support the operation with the best scientific talent available. Upon the arrival of the ARG, they were welcomed and requested to brief the DOD on their capabilities. They, in turn, expressed their desires for full cooperation and mutual assistance in accomplishing the task at hand. These scientific groups were of particular assistance in determining the radiation levels present. The ARG ultimately produced a systematic profile of the entire accident area.

6. PREPARATORY SUPPORT.

DOE, FCDNA, USASIX and Nellis AFB: The preparatory support provided by these agencies proved most beneficial. The pre-exercise planning

briefings provided the Fort Ord NCAIC Task Force an opportunity to analyze and evaluate their mobilization procedures and follow-on actions.

7. COMMENTS ON OVERALL CONDUCT OF EXERCISE.

a. The controller and umpire personnel, although well intentioned, had preconceived notions/expectations about player action response and, when these notions and expectations were not met, an air of disappointment was evident. NUWAX 79, being a "free-play" exercise, does not lend itself to preconceived expectations, particularly on the part of the controllers.

b. The importance of common terminology, doctrine, and regulatory guidance became abundantly clear during the exercise. The lack of unilateral conformity in governing regulations propagated internal problems resulting in some operational confusion. With resources united during highly fluid and stressful nuclear accident response operations, we can ill afford to lose valuable time resolving internal management problems. Of particular note are the following situations:

(1) The decision of when to begin monitoring, as was realized during the Palomares operation, is fundamentally important to the success of the entire operation. Doctrine currently dictates that monitoring will commence only after render safe procedures have been completed. Considering the dynamics of the situation, we find current doctrine inappropriate. We believe the decision to begin monitoring can be justified upon completion of weapons damage assessment by DOE and DOD weapons experts.

(2) The physical security terminology and badging systems employed by the Air Force and Army response forces were of such difference as to result in the loss of some four hours of valuable operations time per man within the Army team during the establishment of the Air Force badging and security system.

(3) Current Army equipment and doctrine professes the capability for its personnel to consume liquids while in a contaminated area and yet umpire personnel declared such action unsafe. The result is a loss of confidence in the Army equipment contributing to the confusion.

(4) Non-Army controller personnel who have been designated to aid in the controlled development of the exercise scenario had noticeably run into difficulty interpreting what actions were underway due to a lack of familiarity with Army terminology and doctrine.

c. The control of personnel and vehicles during this kind of operation is critical. The development of the exercise accident site was inconsistent with the desired traffic circulation plan developed by the task force security officer. The trafficking of vehicles and personnel on a road which split the command post and hot line added significantly to the command and control burden. Had construction of roadways been permitted, as requested, a rerouting of traffic would have been ordered. As a result of this imposed restriction, a less desirable traffic circulation pattern had to be developed and implemented. The outcome of this plan was only marginally effective.

d. The perimeter security of the suspected contaminated area was somewhat slow in developing. Although the task force subscribes to the

philosophy of a type of cross fertilization of radiation monitoring and security personnel, an overcautious timetable was adopted. Future training efforts will be geared to developing a more timely method of deploying radiation monitoring and security personnel to the perimeter of the suspected contaminated area for the purpose of establishing a security/ safety barrier.

e. The Fort Ord NCAIC Task Force brought along the best communications equipment in the 7th Infantry Division--two RATT rigs which would give us secure communications to Fort Ord and Nellis Air Force Base. We also brought with us a single-side-band radio which tied us into the MARS station. Our communications equipment that we brought with us worked well. Anticipating a heavy increase in communications traffic to accompany the arrival of other DOD and DOE response forces, the task force requested the JCS/USREDCOM JACC/CP communications package. In addition to the organic communications capability of the task force, we have identified the need for additional repair capability and the need for a small lightweight secure AUTODIN terminal to provide the task force with immediate access to the worldwide AUTODIN communications system. Due to limited periods of operation of such a system (i.e., exercises and actual operations), the appropriate JCS level activity should be identified and tasked to study the feasibility of providing a TELEX system on a standby and available basis.

f. During the exercise it became apparent that dealing with experienced news media personnel would be a sensitive problem for the task force command and control element. The need for a highly skilled

and trained Public Affairs Officer is critical. In addition, we have found it necessary for the Public Affairs Officer to have the authority to release routine information pertaining to emergency response operations. Such action enables the Public Affairs Officer to develop a sound rapport with the news media through timely, free and sincere releases of information.

g. Joint EOD Operations: Initial problems were encountered as joint EOD operations began. We found that although Marine and AF EOD teams were aware that they were working for the Army On-Scene Commander they were reluctant to render continuous progress reports in a timely manner. This problem was compounded due to the lack of a joint EOD control communications wire/radio net. Once the problem was identified, the Army EOD quickly moved to resolve the problem by establishing a joint Service EOD command post in the vicinity of the hot line.

h. The deployment/redeployment of the task force provided a rare opportunity to implement existing fixed wing movement plans. Airlift of the Fort Ord NCAIC Task Force to and from Nellis AFB went smoothly.

i. The lack of aerial photographic support for the task force came as a surprise. As previously addressed in paragraph 1, aerial photographic support is an essential element of detailed and accurate documentation of the accident and its subsequent operations. Simulation and/or denial of such support is unrealistic and should be avoided during future exercises.

j. Service Support: The full magnitude of the Service support function was not tested during this exercise. The convenient availability

of the Harvest Eagle package causes us to wonder what would happen if this resource had not been available. It is our belief that such a support asset as the Harvest Eagle package should be provided to and be directly responsible to the On-Scene Commander. However, this does not resolve the problem of who provides this service support function. This problem must be addressed at all levels by all services.

8. CONCLUSIONS. As a result of our participation in NUWAX, we have drawn the following conclusions regarding nuclear accident response operations.

a. Worthwhile Exercise: The NUWAX exercise was extremely beneficial to this command as it allowed the task force to mature in its ability to respond to nuclear accidents by eliminating a multitude of misconceptions and misunderstanding which result from oversimulation.

b. Magnitude of Service Support Requirements: During the exercise it became readily apparent that the task force as it is presently configured is not capable of supporting outside assets. Furthermore, there are no plans currently in effect to provide the needed service support in a timely manner. A review of service support requirements, particularly the immediate support required by the DOE/ARG, must be identified and furnished to the DOD so that DOD may make the necessary provisions to provide such equipment immediately upon request. For example, when a DOD element requests the support of the ARG, the element must also request the Service support package required to meet the immediate needs of the ARG. Supplemental requests must be made on order. Finally, additional Service support planning consideration must be given to the personal comfort of response force personnel, particularly in the working areas.

c. Common Guidance for Nuclear Accident Response Forces: The command and control of nuclear accident response forces and operations is inherently complex. The added burden of overcoming different terminology, doctrine, and regulatory guidance only serves to impede effective and efficient operations. Common terminology, doctrine and governing directives within the DOD are essential.

d. Change of Command: The changeover of command between the Army and Air Force On-Scene Commanders occurred too quickly. Due to the vast amount of information generated prior to the arrival of the Air Force response force and the continuously developing situation, the time allotted to assimilate this information was insufficient. It became apparent that a period of shadow operations conducted by the Air Force response force should be of such a duration to allow each element to assimilate the knowledge of their counterpart on site as well as at a briefing.

e. Communications: The communications equipment organic to the task force represented the best available equipment on Fort Ord. Anticipating the arrival of the numerous DOD and DOE response elements to the accident site, the JCS/USREDCOM JACC/CP communications package was requested to increase the communications capability of the task force. Even with this added capability, it is questionable whether the task force communications capability would have been adequate had the scenario involved full play by higher headquarters at all levels. This is an area requiring further examination.

f. On-Scene Commander's Staff: The organization of the On-Scene Commander's staff was in accordance with Army directives. Actual experience gained in this exercise suggests, however, that the staff was only marginally adequate in terms of experience and depth necessary to carry out a difficult, complex operation which may require several weeks, or even months, to conclude. Army doctrine, as well as DOD doctrine, should, therefore, be reviewed to assure that the On-Scene Commander's staff organization provides the necessary experience, technical expertise and depth.

9. LESSONS LEARNED. The following lessons were learned as a direct result of the task force's participation in NUWAX 79:

a. It is extremely difficult and undesirable to move the hot line following the completion of render-safe procedures by EOD personnel due to the number of personnel and amount of equipment which require movement and the amount of contamination spread towards the hot line area as a direct result of EOD processing in and out of the contaminated area.

b. Again, the magnitude of service support as previously discussed was not tested. Although general knowledge was available concerning service support, this knowledge lacked the required specificity. As a result of this exercise, it has become apparent that the governing directives for an operation of this kind do not adequately address the service support requirements involved. The importance of adequate and timely support in nuclear response operations dictates that further study of service support plans is warranted at all levels by all services.

c. The lack of common terminology, doctrine and regulatory guidance will cause internal problems which must be taken into consideration when developing timetables, milestones, and objectives.

d. Public affairs operations are crucial to smooth emergency response operations, and the maintenance of public confidence. Emphasis must be placed on releasing information to the news media on a timely basis and the developing of technical competence within the PAO element. In addition, operational elements of the response forces must insure that information is forwarded to the public affairs element as soon as possible. Finally, the Public Affairs Officer must have the authority to release routine emergency response information.

e. More exercises of this scope are needed and should be conducted on a regular basis with a frequency of no less than every two years.

f. The staff provided to the On-Scene Commander in accordance with Army doctrine is marginally adequate in terms of staff size, expertise and available staff training time. As an example, the operations element, manned by only two officers and four enlisted personnel, remained fully committed throughout the exercise and could not have maintained a peak level of performance for an extended period.

g. The physical positioning of a liaison officer at Nellis AFB (the nearest military installation) proved to be a wise move in that this asset insured accurate and timely processing of requests for assistance/support through personal involvement.

10. RECOMMENDATIONS. Recommend that:

a. Authority to release information pertaining to nuclear accident response operations be delegated to the Public Affairs Officer. This authority should include the admission of the involvement of nuclear weapons materials and the presence of radioactive contamination if contamination results from the accident. Further, understanding that this action would best be served by increasing the preparedness of that officer, recommend that appropriate joint Service schooling be established for NAIC PAOs.

b. The Interservice Nuclear Weapons School develop a course to teach detailed nuclear response command post operations to operations personnel.

c. Full scale NUWAX exercises be conducted on a regular basis. However, to preclude the artificiality created by the Nevada Test Site regulatory restrictions, recommend that future exercises be conducted on DOD facilities. The frequency of these exercises should be no less than every two years.

d. DOD level directives be developed to govern emergency response operations to nuclear accidents/incidents.

e. During future exercises, the full extent of the logistics functions be tested.

f. DOE provide DOD with a listing of immediate service support required by the ARG at the time of their arrival at the accident site in order that this support can be requested at the same time the ARG is requested.

g. A "super team" from FCDNA be created to respond to and assume command of nuclear accidents within the continental U.S. Further, recommend that this team be supported logistically by the Service primarily responsible for the weapons involved.

TABLE I

EXERCISE NARRATIVE

1645	D-5 (13 Apr)	Fort Ord NCAIC TF notified of a Type II Exercise NUWAX alert effective 181400Z Apr 79 until released.
0500 to 2000	D-2 (16 Apr)	Fort Ord NCAIC TF conducted an administrative move by AF C-141 from Fort Ord to Camp Mercury.
1322	D-1 (17 Apr)	On-Scene Commander arrived at Camp Mercury.
1500	D-1	TF rotary wing assets (two UH-1Hs) arrived at Desert Rock/Camp Mercury.
0914	D Day (18 Apr)	Report received from Nye County Sheriff's office that a patrol observed a flash and smoke 30 miles west northwest of Camp Mercury. UH-1 dispatched for aerial recon.
0920	D Day	The task force received a report from an unidentified tourist traveling east on Interstate Highway 95 in which the tourist stated he saw a plane crash west-southwest of Lathrop Wells, NV.
0928	D Day	Nellis AFB reported that an aircraft with special cargo aboard was missing. The aircraft (C-141) was carrying Class "A" explosives which are defined by Army TM 39-20-11, Line #44, 91, 107, 118. Net weight 314 lbs.
0930	D Day	NCAICO ordered the conduct of an aerial recon to locate missing AF aircraft.
0940	D Day	Aerial recon located a large USAF aircraft wreckage strewn over 500 M area, vicinity 19 miles east of Beatty, NV. Black smoke was seen originating from two sources.
0955	D Day	Local firefighting forces telephonically requested from Nye County and Nellis AFB. Fire response forces from Nye County cannot respond (no equipment). Nellis AFB will respond.

1020	D Day	Warning order received from Cdr, 7th Inf Div & Ft. Ord NCAICO and OSC notified. NCAIC Warning Order - Possible weapons accident, location unknown. Be prepared to deploy NAIC TF IAW USASIX NCAIC Plan. Situation: Weapons on board aircraft IAW TM 39-30-11. 2 each Line #44, 2 each Line #91, 2 each Line #107, 2 each Line #118. Property damage and casualties unknown, radiation hazards unknown. No POC at site at this time.
1025	D Day	Warning order acknowledged by message to Cdr, 7th Inf Div & Ft. Ord.
1030	D Day	NAICO gave briefing to personnel of Fort Ord NCAIC Task Force.
1035	D Day	Broken Arrow message sent. Transmit Broken Arrow message, reference phoncon between Nye County Sheriff's Office, Nellis AFB and this headquarters. Location of accident, 30 miles WNW of Camp Mercury, Nevada. Quantity of weapons unknown. Line #44, Line #91, Line #107, and Line #118, identified. Request verification of Line #118. Property damage and personnel casualties unknown. Nye County Fire Department unable to respond, must use assets of Nellis AFB. Cause of accident unknown. Black smoke observed at the location. Existing nuclear hazard unknown, condition of weapons unknown. Recommend immediate dispatch of Fort Ord NCAIC TF.
1041	D Day	Implementer received giving the time and location of the accident site as 181700Z Apr 79 at Coord 116° 23' 30" W, 36° 42' 30" N.
1055	D Day	Deployment order received from Cdr, 7th Inf Div & Ft. Ord. NCAICO ordered EOD to respond immediately. NCAIC Deployment Order - 22nd AF confirmed crash of Flight #1213 U C-141. Deploy NAIC TF to vicinity of: 36 deg 39 min north 116 deg 20 min west Lathrop Wells, NV Assume control of military resources on arrival. Coordinating instructions: assume responsibility from courier officer LT I. M. Lost. Controlling civil authority unknown. Additional support available from Nellis AFB, NV. Fund cite will follow, FORSCOM has not been notified.
1100	D Day	Telephonically requested external support from Nellis AFB DRF, mortician, Nye County representative, NV state disaster coordinator representative.

1120	D Day	Telephonically notified USARCS and Nellis AFB claims officer of need to process possible claims.
1126	D Day	Telephonically requested civilian police escort to accident site.
1130	D Day	Deployment order acknowledged by message to Cdr, 7th Inf Div & Ft. Ord.
1130	D Day	NAICO with staff representatives departed Camp Mercury via UH-1H for aerial recon of accident site. Main body of TF departed for accident site.
1135	D Day	Telephonically requested water table information from civilian drilling supervisor Wally.
1138	D Day	Message sent to USASIX requesting that FAA issue warning to pilots not to fly within 10 nautical miles of accident site and at 10,000 AGL or higher.
1200	D Day	Support team departed Camp Mercury enroute to accident site. Nellis AFB DRF on standby.
1205	D Day	NCAICO reports visual recon, sighting of (2) craters-HE (1) nuclear weapon, (1) nuclear weapon container (1) casualty.
1215	D Day	Telephonically requested Nellis AFB DRF to be sent to accident site to assist NCAIC TF.
1230	D Day	EOD arrived at accident site and begins accident response operations.
1252	D Day	Main body of task force arrived at site.
1305	D Day	OSC deployed to site by UH-1H.
1305	D Day	Two (2) Spanish speaking people at Alpha 1 in location. One is owner of ranch where accident took place.
1327	D Day	5.2 disintegrations per minute main command post at accident.
1350	D Day	Telephonically notified hospitals to see if they could handle radiation contamination cases. Nellis AFB hospital standing by. Also requested

		federal marshal, representatives from Department of Health, Environmental Safety, Fish and Game Department, Department of Agriculture, Attorney General's Office, and local federal judicial district.
1352	D Day	EOD entered contaminated area.
1406	D Day	EOD encountered 2000 CPM 50 meters west of the crash site.
1420	D Day	EOD found one (1) casualty.
1430	D Day	Initial SIT EP message sent to USASIX: Location of Command Post to be in the general vicinity of Grid Coordinates NL 547 642. Status of Forces include Ft. Ord NCAIC TF, 49th EOD and Nye County Sheriff. Request firefighting forces of Indian Springs and Nellis AFB respond.
1432	D Day	Telephonically requested USAF ATRAP team.
1442	D Day	Telephonically requested Decon Team from Nellis AFB.
1448	D Day	*Casualty pronounced dead by team physician.* One (1) Weapons System, W70 U.S. Army, serial # NUWAX 79-70, was found pinned under the aircraft wing. Condition unknown, however, container shows extensive damage.
1455	D Day	Two (2) casualties in vicinity of cockpit, found by EOD.
1500	D Day	Second weapons system, B61, USAF, was found buried up to 15 inches in the ground about 70 meters northeast of crash site. Condition is unknown.
1505	D Day	Telephonically requested heavy equipment to help recover weapons systems.
1515	D Day	Telephonically requested Army, Navy, AF EOD teams.
1526	D Day	Telephonically requested Nye County coroner (Jesus Morales) pick up unidentified human remains at accident site.
1534	D Day	Third weapons system, B43, US Navy, serial #0010, was found stuck in the fuselage of the aircraft. Condition of weapon is unknown, however, casing is scorched on right side.

1554	D Day	A total of six unidentified sets of human remains have been located.
1600	D Day	OSC Commander establishes a National Defense Area to protect downrange area.
1609	D Day	Telephonically, self-contained light sets requested from Nellis AFB.
1611	D Day	Correction on count of human remains, there is a total of 5 not 6.
1616	D Day	Nellis AFB Task Force arrived.
1645	D Day	First press release made by PAO.
1646	D Day	Periodic SITREP message sent to USASIX.
1700	D Day	Requested further ID. Request the following information and equipment be provided: tail number of aircraft, total number of crew and pax, full identification of crew and pax, twelve (12) self-contained area exterior lighting sets, ETA of personnel and equipment previously requested.
1711	D Day	Periodic SITREP message sent to USASIX. NCAIC SITREP, first report of crew members. Two high order explosions. Contamination reported 50 meters west of accident site. RSP being conducted by EOD. Support requested from RADCON, RAMT, ERDA/ARG, lab weapons design specialist, scty (Nellis AFB), Fort Ord ARF, 5,000 gal water tanker, FBI, representative from NV governor's office, DOE representative, JCS JACC/CP communications, USAF DRF, fire truck with high pressure hose. Request FAA impose NOTAM at one mile high and ten miles in radius over accident site.
1731	D Day	A fourth weapons system, B43, has been located. The shipping container failed during crash allowing contents to be scattered over a 50 meter area. Further, identification is unknown at this time.
1810	D Day	Alpha Team went into site for initial monitoring.
1850	D Day	Security team reports complete perimeter formed for night security.
1900	D Day	Operations terminated for D-Day; security in place; and personnel moved to Harvest Eagle.

2039	D Day	Periodic SITREP report of Nellis AFB Disaster Preparedness Team to the NCAIC forces, also the Nye County Asst. Coroner. Six unidentified personnel found dead at the crash site. Landowner located. Damage assessment and verification continues. Request status of EOD team.
2300	D Day	Mr. Clark, POC for DOE, arrived at the accident site along with members of the ARG.
0745	D+1 (19 Apr)	Implementer: The following list of crew members was provided. Capt Wilhelmson, Ronald L., 523-68-9614, pilot; 1Lt Pusch, Michael J., 394-58-6453, navigator; Capt Sherman, David P., 193-36-5622, flight engineer; MSgt Ford, Jon A., 367-38-7122, flight engineer; MSgt Wright, Henry J., 252-62-0916, loadmaster; SSgt Waters, Rudy A., 309-58-2666, loadmaster; SSgt Godwin, James (Dorn) Jr., 456-74-3956.
0800	D+1	Request by MSG for support to Nellis AFB. Request one transmitter, RT-718 /FRC-93, Collins model KWM-2 or 2A and one antenna, GRC 50 or 155 with poles and guide ropes. Request these items be provided NLT 2000 hours local time this date.
0925	D+1	A fifth and sixth weapons system, Line #118, has been located 20 meters north of the tail section of the aircraft.
0954	D+1	Aircraft tail number identified as USAF 53126 by EOD.
0959	D+1	Requested by MSG to Nellis AFB that a class "A" representative from local telephone company be dispatched to accident site. Request Nellis AFB release (75) sleeping bags for use by civilian team members at site. Request for assistance from the regional commercial telephone activity/office, dispatch to this location ASAP. Provide name, mode of transportation and ETA ASAP.
1023	D+1	Navy EOD team begins joint operations with 49th EOD.
1030	D+1	Render safe procedures for Navy weapons systems are completed.
1100	D+1	6th body found in vicinity of tail section by EOD.

1115	D+1	Periodic SITREP message sent to USASIX. The following additional military support are on site: Navy EOD from Hawthorne, NV and China Lake, CA, and 34th EOD from Sierra Army Depot. Total military forces to date = 206. Additional support on site: Thirty (30) DOE personnel from Sandia Lab, NM, LLL, NAVEW, ALO, and LASL. Cause of accident remains unknown. Electrical RSP completed. No change on W70 weapons system. AF EOD on site, and a fourth nuclear weapons system has been identified as USMC system. No change in property damage. Tail number reported as USAF #53126, request confirmation. LT Lost not yet located, search and rescue operations continue.
1145	D+1	Second press release made by PAO. Radiation contamination acknowledged.
1201	D+1	34th EOD arrived at 2200 hours, 18 April.
1220	D+1	Army weapons system rendered safe by EOD.
1430	D+1	Eight (8) demonstrators showed up in area; they are accompanied by a civilian lawyer. Down range operations temporarily suspended.
1505	D+1	Nye County Sheriff arrived at site.
1530	D+1	PAO discussed second press release with press representatives who covered demonstration.
1535	D+1	Down range operations continue.
1540	D+1	A seventh weapons system, W70, U.S. Army, was located near the tail section of the aircraft by EOD.
1600	D+1	An eighth weapons system, B61, USAF, serial #001 with GO NUWAX marking, was located west northwest of the crash site. Weapon experienced low order detonation upon impact.
1630	D+1	Two (2) 12 volt batteries telephonically requested from Nellis AFB.
1635	D+1	Navy EOD reported that they found a component of USMC weapon.

1637	D+1	Telephonically received information from Nellis AFB that RAMT and RADCON teams will arive 1900 hours.
1640	D+1	Demonstrators left area.
1720	D+1	B43 (Navy) (detonated) fragments in crater identified by NS #169. By EOD.
1800	D+1	22 AF/DRF given a change of command briefing by OSC, Fort Ord Task Force.
1801	D+1	Portions of W70 and parts of shipping container found by EOD.
1810	D+1	Periodic SITREP message sent to USASIX. On-Scene Commander and Disaster Response Force from 22nd AF, Travis AFB, CA arrived on site. Cause of accident unknown. Navy EOD verify safe condition. Downrange operations temporarily terminated due to civilian demonstration on scene. Demonstrators with picket signs moved into area, security, PAO, legal, Nye County Sheriff respond, demonstrators respond. Electrical render safe procedures have been completed on the B43 weapons system located under the wing section and has been verified in safe condition by Navy EOD. A second B61 has been located 150 meters west northwest of crash site. As a result of low order detonation, components and materials were scattered over a 50 meter area. A second B43 weapons system was found 120 meters west northwest of the accident site. As a result of low order detonation components and materials were scattered over a 30 meter area. Two additional weapons systems, Line #118, have been located 20 meters north of the tail section of the aircraft. No change in extent of property damage. Press release is summarized as follows: "USAF aircraft which crashed involved high explosive and radioactive materials, no further danger of explosion. Public asked to remain clear of area."
1830	D+1	Navy EOD found seventh unidentified body.
1831	D+1	22 AF/DRF assumed command and control of accident site.
1930	D+1	Periodic SITREP message sent to USASIX. No change in NCAIC forces. US Army RAMT and RADCON ETA this location 1900 hours local time. Cause of accident unknown. Downrange operations resumed at 1540 hours (local). No change in property damage. A second W70 weapons system was located near the tail section

		of the aircraft. Effective 200200Z Apr 79 a change of command and control of accident response operation was completed. OSC is BG Gardner, 22nd Air Force, Travis AFB, CA. New OSC requests retention of U.S. Army assets at accident site.
1940	D+1	ATRAP arrived.
1945	D+1	Operations terminated for day.
0700	D+2 (20 Apr)	Fort Ord Task Force operations continue in support of new OSC.
0930	D+2	RAMT and RADCON teams arrived on site.
0945	D+2	Components found on 19 April identified by SN #123. By EOD.
1030	D+2	Periodic SITREP message sent to USASIX. Status of NCAIC forces: U.S. Army RAMT team, RADCON team and EOD from Sierra Army Depot have arrived on scene. Cause of accident unknown, recovery and removal operations continue. No further weapons systems located. All remains of deceased personnel have been evacuated through the Nellis AFB Mortuary channels (simulated), and all suspected crew members now have been located, confirmation pending identification of remains. Air Force press release issued 201530U Apr 79 summarized as follows: Presence of nuclear weapons confirmed. No hazard to public health or safety. Casualty info of dead released, no identity released pending notification of next of kin. Possibility of radiation (alpha) with explanation of hazards, acknowledged vicinity of aircraft wreckage. All weapons accounted for except for components of Line #118. Considerable operational delays were experienced due to administrative and security problems but are now easing.
1508	D+2	Two intruders attempting to break security perimeter were apprehended by security personnel.
1625	D+2	USAF weapons system rendered safe. By AF EOD.
1630	D+2	Periodic SITREP message sent to Cdr, 7th Infantry Division and Ft. Ord: No change. Task Force continues to support AF OSC.
1900	D+2	USAF OSC given briefing with staff and team leaders.

1910	D+2	Operations terminated for day. Continued operations in support of OSC.
0700	D+3 (21 Apr)	Fort Ord Task Force continued operations in support of OSC.
0834	D+3	22 AF/DRF requested (5) M151A1 and (2) M35A1 trucks to supplement mission on accident site. Equipment was provided by security and support teams.
1800	D+3	Periodic SITREP message sent to USASIX.
1910	D+3	Twenty-four (24) MP's remain OPCON to 22 AF/DRF for security. To be released 24 April.
1920	D+3	Operations terminated for day.
0700	D+4 (22 Apr)	NCAIC Task Force (-) prepared for road movement. (30) personnel, (2) ¼ ton trucks, (1) SWB-22 with wire, and (1) GP medium tent remain in support of 22 AF/DRF.
1510	D+4	TF (-) convoy arrived Nellis AFB with all personnel, equipment, and vehicles accounted for. Redeployment preparation begins.
1100	D+5 (23 Apr)	TF (-) process through MAC ALCE as a part of preflight joint inspection.
1000	D+6 (24 Apr)	TF (-) moved to flight line.
1145	D+6	First flight left for Monterey Airport.
1904	D+6	Last flight arrived at Monterey Airport.
1930	D+6	TF (-) closed Fort Ord, CA. EOD notified.
2000	D+6	Log closed.

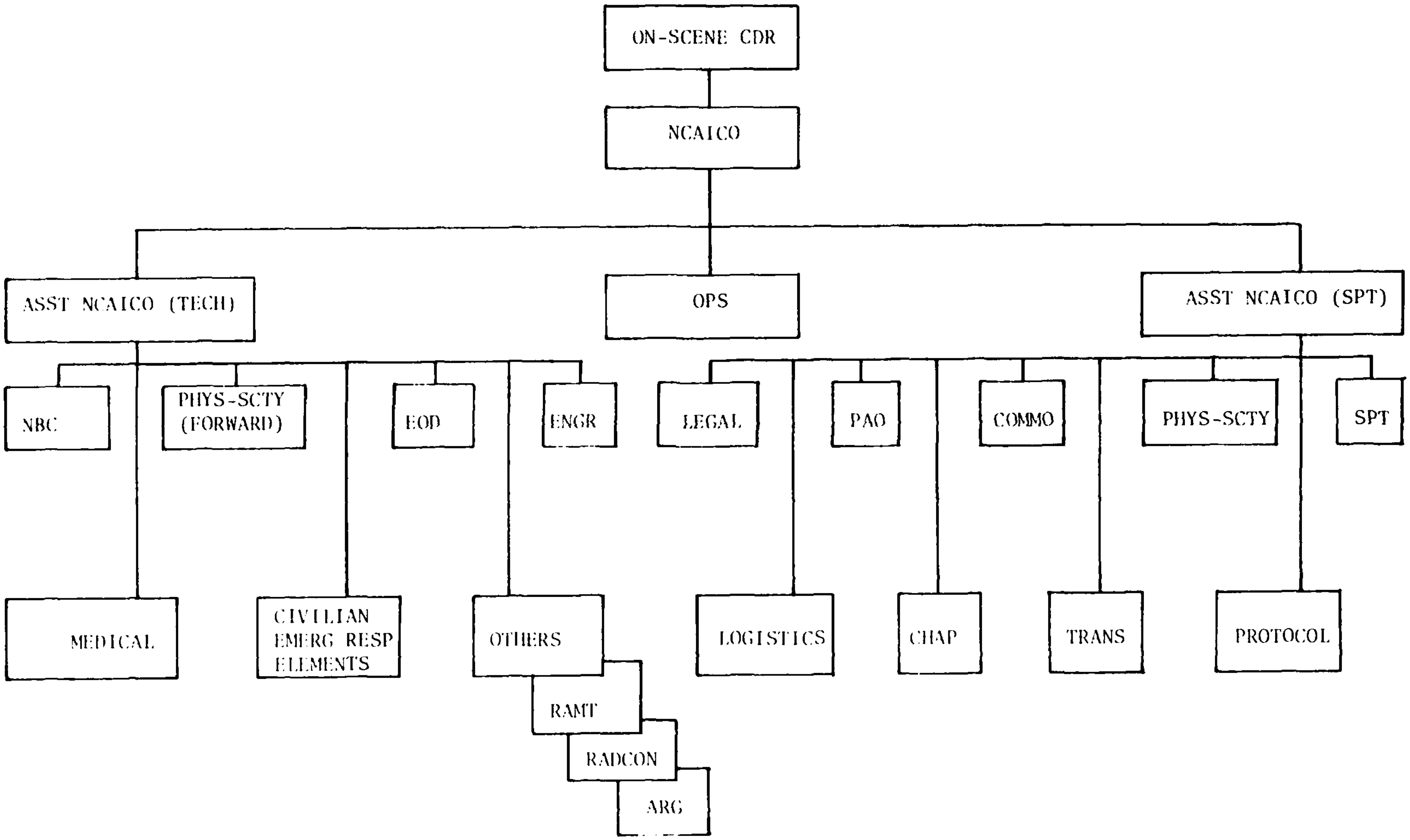


Figure 1. Organizational chart.

3. <u>AIR FORCE</u>: The following is the Air Force After Action Report in its entirety.

1. SCENARIO.

a. Clarity: The scenario was clear and provided a real world environment in which to conduct recovery operations. Most players were highly complimentary regarding the thoroughness of the exercise development and execution.

b. Realism:

(1) Time compression placed the DRFs under unrealistic pressure to expedite planning and execution of operations which would, under normal circumstances, take months to complete. This time compression is accompanied by a loss of objectivity by both players and control staff. Control staff planned activities were dictated by time and budget; however, these factors should be carefully weighed when analyzing the results to insure FINDINGS are in a proper perspective.

(2) Finding a fully erected Harvest Eagle site conveniently adjacent to the accident site was unrealistic but welcome. Obviously, a real accident would require a monumental effort to billet and feed a rapidly expanding response force which would dictate a large supporting staff. Most players agreed that the Harvest Eagle site location was unrealistically far from the accident site. This caused some delays in transportation, communications, and support.

(3) RED HORSE assets were denied to players. This was unrealistic since we requested that a Harvest Eagle set be deployed to the site and all assets would normally be available to the OSC. Inability to use RED HORSE vehicles, deploy MOGAS where needed, and use of RED HORSE personnel was unreasonably restrictive and irritating to player personnel.

(4) The published hours of operations from 0700 to 1900 were unrealistic considering the operating environment and was not adhered to by the control staff. In reality players and control personnel worked from 0500 to 2400 (or later). The hours (worked) were determined by the necessity to accomplish as much as possible in six days. The control staff did nothing to alleviate this situation; in fact it, in effect, encouraged it. The initial critique criticized the DRF for not conducting business from an even earlier hour (a suggestion which we unanimously agreed to early in play).

(5) Withholding aerial photography and commercial telephone communications also was unrealistic and inhibited player personnel.

c. Adequacy: The scenario was a very ambitious test of most of the DOD/DOE resources available to respond to a nuclear accident. We could not have asked for more! Lack of contaminated crew members (dead), or casualties requiring decontamination, throughout the exercise was a shortfall. The limited contamination problems given were insufficient to exercise the medical staff.

d. Site Location: Site location and preparation was highly realistic and did much to provide the total response force with a challenging, realistic, and exciting test. FCDNA is to be congratulated on the excellent planning and execution in this area.

2. USE OF IMPLEMENTERS.

a. Timely: In general, all player personnel felt constantly challenged. Little time was spent without some action going on. The question of environmental and public health impact was too late in the scenario. Also, the concern for the rancher's health and offering follow-up to area civilians was delayed. Earlier interjection of these issues would reflect "real world" priorities.

b. Understandable: Well prepared, knew what they were doing and when to do it.

c. Adequate: For the most part they were excellent. However, information regarding accurate crew lists and cargo manifests at point of origin were lacking and impeded the realistic actions of the DRF. These things are automatic in any accident response check list and should be added to future exercises to insure realism. The magnitude of medical and environmental concerns could have been elevated. The toxicology of other hazards within the aircraft and weapons was not addressed.

3. EXERCISE NARRATIVE OF EVENTS WHICH TRANSPIRED.

a. D-Day (18 April 79)

(1) OPREP-3 PINNACLE BROKEN ARROW accident notification was received at 181820Z APR 79.

- Notified DCS/Operations
- Activated Crisis Action Team (CAT)
- Retransmitted OPREP-3 to HQ MAC
- Passed crash coordinates to 6th Army.

(2) Received T.O. 11N-20-11 Line numbers of weapons on board.

- Passed to EOD.

(3) Notified and formed DRF.

- Briefed DRF on crash and directed them to coordinate with counterparts at Nellis.

- Briefed on outprocessing time at terminal (1600L).

(4) Contacted 6th Army NAIC team at crash site.

- Determined team composition, status of aircrew (no survivors) and weapons (3 located).

- Requested helicopter transport from Nellis to crash site. 6th Army will provide.

(5) Dispatched DRF deployment/support request message (DTG 190145Z APR 79).

- Requested aerial photo coverage of crash site.
- Requested OEHL support.
- Requested JACC/CP communications from REDCOM/JCS.

(6) Out-processed DRF at 1600L. Aircraft and team ready for departure at 2000L. Estimated time of departure is D + 1 190700L.

b. D + 1: (19 April 1979)

(1) 22AF Disaster Response Force (DRF) departed Travis AFB at approximately 0655L and arrived at Nellis AFB at approximately 0800. Vehicle support for convoy of the DRF to Jackass Flats (Nevada Test Site) was not available on arrival. The transferring of cargo and people from the aircraft to vehicles consumed 3 hours and 15 minutes, which was excessive in light of the advanced preparations. However, in an actual accident situation, this probably would not be unrealistic, due to limited time for coordination efforts. The convoy departed at 1115 hours with 9 vehicles.

(2) The convoy used Security Police hand-held radios for Command and Control and the movement from Nellis AFB to Harvest Eagle camp site proceeded without incident. The convoy arrived at 1400L. Security entry into the Nevada Test Site area consumed approximately 2 hours for all personnel.

(3) The remainder of the day was involved in coordination with the Army Support Staff Officer and preparing for the change of command. This change-over was severely hindered by a large influx of arriving personnel who needed accommodations, feeding, and briefings. As a result, the command change-over procedure was minimal and although the command change occurred, the 22AF Camp Commander had little opportunity to achieve coordinative efforts with his Army counterpart.

(4) Change-of-command briefing was conducted at the Harvest Eagle briefing tent at 1700.

(5) AF OSC assumed command at 1800L.

(6) 1830L - JA simulates visit to landowner culminating in his consent to establish National Defense Area (NDA).

(7) 1900L - OSC reestablishes NDA.

(8) EOD: Departed Travis AFB via C-141 aircraft. Arrived Nellis AFB and departed Nellis via Army helicopter. Arrives NTS (Harvest Eagle site) and helped arrange billeting and tent assignments for 22AF DRF. Received briefing from Army EOD counterpart.

(a) B-43-SN0010-RSP accomplished on 19 Sep 79 by Navy EOD team. The weapon had been found in a nose-down position through the fuselage of the aircraft. Using a crane, the Navy EOD team had removed the weapon from the aircraft fuselage, wrapped it in two layers of plastic and placed in rear holding area. Weapon is intact. DOE personnel feel that appropriate damage assessment was not accomplished on this weapon prior to removal from wreckage.

(b) W-70-SN NUWAX 79-70. RSP accomplished on 19 Apr 79 by Army EOD team. Weapon was still inside H511 container and had been located under aircraft wing. A crane had been used to move wing to gain access to H511 access doors.

(c) B-61-SN001. Weapon was located in a nose-down attitude buried in the sand up to the junction between tail-bomb subassembly and the preflight selection bomb subassembly. Nellis AFB EOD team had not been successful in attempts to excavate the sand and perform RSP. Weapon appears to be intact.

(d) Two craters had been discovered and it appears as if one B43 and one B-61 had detonated as components of weapons were discovered in area around craters.

(e) The second W70 had not positively been located but W70 components were discovered in vicinity of tail section.

(f) Eight full or half target rings had been discovered in vicinity of tail section. No residue or fragments of the H1343 target ring carrying cases have been found. Change-of-command ceremony transferring responsibility from Army to Air Force was accomplished. Army EOD personnel briefed the AF OSC and DRF staff on weapon status as listed above. An EOD/DOE meeting was held to determine priorities for actions on 20 Apr 79. Due to the criticality possibility with the target rings, the search for these was given Priority #1. Priority #2 was given to RSP of B61-SN001 as it was the only intact weapon that had not had RSP accomplished. Priority #3 was given to Navy EOD teams to search NE quadrant for the B43 components. EOD input for SITREP turned into 22AF DRF CP.

(9) 1900 - Daily briefing and planning session.

(10) 2200 - Prepared and dispatched initial SITREP.

c. D + 2 (20 April 1979)

(1) 0630 - Daily plan briefing (Para 3c(3)(m)).

(2) Info: Cleared release with General Gardner. Release sent in message form to world - requested Nellis IO to release to AP/UPI/local press. Simulated notifying local press of 1530 press conference at Harvest Eagle site. DOD notified us that time too late for East Coast press deadline - changed conference to 1330. Conducted press conference and released press release three. Press requested earlier press conferences - agreed on 1030, and promised technical experts to discuss health aspects of accident. Escorted press to entry point of accident site. Two men in a dune buggy entered the National Defense Area and were apprehended by Security Police. They were checked for

identity by a local deputy sheriff, examined for contamination, cleared, and turned over to the local authorities. Relayed this information to the press. Mrs. Lost, claiming to be the mother of one of the crew members, appeared demanding to see the On-Scene Commander. The On-Scene Commander gave her all the information he had - which was that the bodies had been taken from the wreckage, been decontaminated, and turned over to Nellis AFB Mortuary Affairs for further disposition. This satisfied Mrs. Lost and she departed. Both the dune buggy and Mrs. Lost incident were recorded on video tape by the media.

(3) EOD: Established 22AF Command Post; located in back of 2701st EOD Squadron 2-1/2-ton vehicle. The CP was operated with the assistance of Capt Doe and other personnel of 2701st EOD SQ. A combined Marine/Army/DOE/EOD team proceeded through the hot line and searched the area around the tail section of the aircraft. During the course of the day, they located/verified seven full target rings and one half target ring. It should be noted here that without the use of the DOE gamma meters it would have made locating the target rings a very difficult task. Many of the target rings had been covered by blowing sand and made visual sighting impossible. An Air Force team consisting of 2701st EOD Sq personnel proceeded through the hot line enroute to the intact B-61. As the sand was shoveled away from the weapon, it was found that the bolster was still attached and had sheared the front lug, twisted around so it covered the access door. Attempts to dig down to observe the ready-safe switch caused the weapon to shift in the sand and presented a hazard to the EOD team. The team processed out of the hot area. A second AF EOD team proceeded through the hot line with the crane and operator. The crane was used to stabilize the B-61 while the sand was dug away. The weapon was twisted in the bolster to gain access to preflight access door. At this

time RSP of B-61 was accomplished. The senior DOE representative requested that the B-61 not be pulled from ground until further damage assessment could be accomplished to determine if any internal damage had occurred. The Army/Marine team found the cargo manifests in the aircraft fuselage and processed them back through the hot line. It was noted on the historical documents of the intact W-70 that the device covered in T.O. 60N-W-70.75-6, para 6-1.11.a had accidently been functioned prior to shipment and subsequent actions should take this into consideration when determining further continuance of RSP. A second Army team proceeded through the hot line and removed the cover from the H511 container and began damage assessment of the W-70 NUWAX 79-70. They discovered gross damage had occurred. The weapon case was torn open and high explosive exposed. Further damage assessment by Army EOD and DOE personnel resulted in decision to replace cover and wait until morning before taking any further action. Navy EOD team located component described in T.O. 60N-B43-6, para 6-3.3.1B, from B43 that had detonated. A reading of .28 mr @ 1 meter from the component was recorded. Component described in T.O. 60N-B43-6, para 6-3.3.1.10 was located. The impact spike was found in bottom of crater. Nellis AFB EOD team went around the outside of the hot line to check out the suspected hot area east of accident site. They discovered a hot area running due east 300-400 ft long with readings of 300,000 CPM and .1 mr surface contamination with readings peaking in center of line. They found no evidence indicating that any components had been thrown this far out. The earth was not disturbed to indicate components had fallen to the ground. The team processed back through the hot line. An Army EOD team was sent out with Security Police to monitor a dune buggy that had been stopped. The buggy contained a piece of metal in a cardboard box and some exposed film. The box and film were contaminated with

3,000 CPM. Components were checked by DOE and decided that it was not part of a weapon system. They were placed on hot side of line for disposal/ decontamination. All teams were processed through hot line and hot line closed closed for the day. An EOD/DOE meeting was again held to determine priorities for following day. Army EOD with DOE personnel will perform radiograph of W-70 warhead to try to determine internal damage. Marine EOD team will continue search for target rings. Air Force and Navy EOD teams will continue search of area around two craters for remaining components of the two weapons.

(4) Personnel decontamination team and two 1500-gallon water tankers ready for use upon activation of entry control point. Several requests for heavy equipment with operators received for use inside the hot line area. No equipment, however, was ultimately used inside the hot line area this day. Engineering Site Developers requested to be on standby for possible use inside the hot line area to determine accurate distances of major weapon and aircraft components relative to the focal point. They were not used that day due to RSP operations.

(5) Civilian teams arriving without sleeping gear. Harvest Eagle (HE) will issue blankets until we can get sleeping bags from Nellis. Called in at 2100 via WSC-3 after some waiting for message traffic.

(6) Civil Engineers request 3 additional site developers with CNWDI eligibility. Relayed to Nellis at 0930. Nellis wants us to pick up sleeping bags - could not comply.

(7) Seven vehicles requested including 4 jeeps with four-wheel drive for Security. Lt Col Dickinson handling this one.

(8) Immediate requirement for light carts at hot line, RADCON team slightly contaminated. Red Horse would not furnish. Security Police provided two portable units.

(9) A medical/environmental staff meeting held at 0800 to assess capabilities and outline plan of action. Teams on hand were OEHL Technical Services, RAMT, Lawrence Livermore Labs (LLL), and Los Alamos Laboratory. 22AF/DRF Medical/Bioenvironmental staff provided coordination and liaison. Team personnel and capabilities forwarded to Col Grimaud, OPS officer, via Col Farmer. Lawrence Livermore Laboratory (LLL) tasked with collecting remote environmental soil samples, OEHL to review hot line procedures, RAMT collecting air and water samples, and LLL doing laboratory analysis of environmental samples. At 1430, a debriefing by U.S. Army Alpha Team chief was received: limited radiation monitoring, concentrated from 500 to 850 meters, had been completed. At 1700, LLL began soil sample collection.

(10) Was involved in organizing and readjusting the camp routine and determining vehicle, supply and communications resources available. The On-Scene Commander decided that all resources on the site would be combined to provide maximum support toward the effort. Therefore, instructions were put out to all participating units and agencies that lists of their personnel, vehicles and equipment would be provided to their OSC functional staff counterpart as soon as possible. This was eventually accomplished by all agencies after dutiful prompting by the Command Post staff.

(a) A shortage of sleeping bags for civilians was solved when the Nellis Security Force returned to Nellis AFB and left their 35 sleeping bags for issue to the 32 civilians. Adequate sleeping bags were available for the remainder of the exercise.

(11) 1900 - Every Staff Meeting:

- Briefed accomplishments of day
- Planned activities for EOD and RADCON

(12) 2030 - Prepare and Dispatch SITREP.

20 APRIL 1979

PLANNED OPERATIONS

1. SECURITY: ESTABLISH POSITIVE ENTRY CONTROL AND NDA*

2. OPEN HOT LINE 0830

3. EOD PRIORITY

    1. TARGET RINGS - MARINES/ARMY (4) 0840

    2. RSP - B-61 2701 (4) 0850

    3. SEARCH NE QUAD - NAVY (12) 0920

    4. SITE DEVELOP 0930

    5. WIRE CLEANUP - ARMY 1000

4. CP RELOCATION

5. EOD RELOCATION

6. ATRAP LOCATION

*NATIONAL DEFENSE AREA

d. D + 3 (21 April 79)

(1) 0630 - Daily plan briefing

(2) The camp routine was established with camp wake-up at 0500 hours. This was the first day of the adjusted normal camp routine, and several problems surfaced.

(a) KP duties: KP roster was posted. The Camp Commander received numerous complaints from agency and team chiefs because of the KP impact on their operation. Since few participants were of grades E-4 or below, KP duties would be assigned primarily to the 35 Security Police members. Discussion with the Security Police Commander and other concerned team chiefs disclosed that KP duty would have a very adverse impact on their mission capability. The OSC directed the KP support be obtained from outside the camp, either from Nellis AFB or from MAC resources.

Coordination with Nellis indicated that they could not support the requirement; therefore, headquarters MAC was queried, and 4 personnel from Norton AFB were dispatched via vehicle transportation to the Harvest Eagle camp site for arrival on D + 4.

(b) All vehicles were assigned to specific teams with few vehicles available for on-call support. The Transportation Staff Officer had difficulty obtaining vehicles for the hot line requirements. The Camp Commander also learned that all the vehicles available in the Red Horse contingent were not available for use in the hot line area. Requests for fuel and fresh water support at the hot line were complicated because the Red Horse team could not provide vehicle support based upon instructions they received from the Exercise Control Staff. These problems were eventually resolved without their assistance. Additional vehicle support was requested from Nellis AFB and HQ MAC.

(c) A wind and sand storm started on this day, and because of high concentration of dirt in the food tents, it was necessary to serve K-rations for the evening meal.

(3) Crash site needs fuel for generators. HE provided 10 each Jerry cans.

(4) DOSC requests EMU-10, 10 KW generator for ATRAP. Additional hot line (HL) requests received for rubber mats (10'-20' long), tarps (large), soft bristle brushes (3") and surgical gloves (50 pr). All passed to Nellis at 1815. Nellis offers 15 KW generators as sub for ATRAP request. Accepted. Contacted ATRAP Team Chief (Mr. Juarez) who agreed 15 KW was okay. Contacted JACC/CP electrician who will try to fix magnet on ATRAP generator in the morning.

(5) Site developers were requested to prepare 20-meter-square grid map so that it would be available first thing Sunday morning. We were also tasked to transpose information shown on oblique aerial photographs to the newly

prepared grid map. Grid map and transposition of aerial photograph information was complete by 0130, Sunday morning (D+4).

(6) Press conference with General Gardner and experts from DOE (Lawrence Livermore and Los Alamos) and Air Force and Army public and environmental health experts. Press-raised questions of tritium not completely answered by experts.

(7) EOD: Opened 22AF EOD Command Post. Army EOD team with DOE personnel proceeded through hot line. Team took two radiographs of W70 warhead after making some additional cuts in warhead skin. Radiographs processed through the hot line and pictures developed by DOE in their processing trailer. After the pictures were developed and reviewed by EOD and DOE personnel, a conference was held to determine the best course of action. No further action taken on this date. Air Force EOD team with DOE personnel proceeded through the hot line to search the area around the crater caused by the detonation of the B-61. Several classified components listed in T.O. 60N-B61-6, Table 7-3, were found in the vicinity of the crater. Marine EOD team proceeded through hot line to area near tail section. They found a broken part of a half ring. At one meter from tail, they located six-inch-diameter ball that was identified as the component listed in T.O. 60N-W70.76.6, para 6-3.5.1.d. The item was covered by a yellow plastic bag and placed alongside aircraft tail section. All EOD teams proceeded back through the hot line and hot line closed for the day. An EOD/DOE meeting was again held to determine actions for following day. Air Force and Navy EOD team would again search the northeast quadrant for missing weapon components. Marine and Navy EOD teams would again resume search for missing target rings in vicinity of aircraft tail. Army EOD team with assistance of DOE personnel would perform foaming procedures on W70 warhead as listed in T.O. 60N-W70.75.6 and T.O. 60N-1B. EOD input for SITREP turned into 22AF DRF CP.

(8) OSC served with State Court Temporary Restraining Order (TRO) to cease all activities at the accident site. Judge Advocate (JA) advises OSC to disregard TRO for lack of State jurisdiction. JA simulates notice of TRO action to HQ USAF/JA, MAC/JA, Nellis JA, and US Attorney. JA meets and briefs the press regarding TRO action.

(9) Message sent requesting additional high-volume air samplers and power sources. OEHL/TS consulted on appropriate personnel and equipment decontamination limits. RADCON team from Aberdeen, Maryland, tasked with supplying STAPLEX air samples and conducting background air samples at hot line. Assisted in establishing new hot line closer to crash site at 1800. At 1930, DRF briefing was held and the disposal team from Kelly AFB arrived and briefed staff. Lack of adequate maps for plotting was discussed.

(10) 1930 - Daily briefing and planning session.

(11) 2200 - Prepared and dispatched SITREP.

21 APRIL 1979

PLANNED OPERATIONS

1.	FINAL PLAN/BRIEF	0630
2.	RECO ISSUE EQUIP	0700
3.	COMBINED RADCON/EOD/DOE SURVEY SE QUAD	0800
4.	EOD CONTINUATION RSP ON W-70	0800
5.	COMPLETE INVENTORY BRIGADE TENT	0800
6.	PRESS CONFERENCE	1030
7.	BOTH TEAMS EXIT HOT LINE	1200
8.	DOE/EG&G AERIAL SURVEY	1200/1400
9.	EOD SEARCH B-61 CRATER	1400
10.	RADCON (COVER HOT LINE AREA AND ENTRY ROAD)	1430
11.	EOD SEARCH TARGET RINGS	1500

12. ALL TEAMS EXIT HOT LINE 1800

13. DAILY SITUATION BRIEFING 1930

e. D + 4 (22 April 79)

(1) 0630 - Daily plan briefing

(2) 1030: Press conference. Passed out release and hot line photos taken day before. Press advised Mayor of Las Vegas enroute to complain about health hazard to Las Vegas and loss of tourist revenue. Mayor arrived and wanted to see the On-Scene Commander. Escorted to accident site where On-Scene Commander met with Mayor; meeting recorded on camera. Mayor requested On-Scene Commander visit Las Vegas - General Gardner said he would Tuesday afternoon - Mayor wanted sooner - but On-Scene Commander unable to comply. Press still questioning danger from tritium.

(3) 1600: Meeting to discuss briefing to be given to representative of Secretary of Defense at 1700.

(4) 1630: Four terrorists attempt to penetrate National Defense Area. They are apprehended and turned over to FBI, but two Military Police are killed.

(5) Environmental meeting held to discuss survey data and plans. Review begins of U.S Army Alpha team logs. In preparation for a 1700 meeting with representative of the Secretary of Defense, a 1400 medical/environmental meeting was held with all teams (except EG & G who did aerial survey). Plan developed for presentation of briefing and technical data was gathered. Final data were coordinated and packaged for briefing. A 1600 walk-through briefing was conducted for Gen Gardner, with the formal briefing given at 1700 to Dr. Wade, Secretary of Defense representative.

(6) EOD: Opened 22AF EOD Command Post. Air Force and Navy EOD team proceeded through hot line. The parachute from B-61 located near crater. Permission received from DOE to remove intact B-61 from sand and transport to hot line for processing by PANTEX personnel. Action completed. NOTE: Permission given by umpires to simulate double wrapping by EOD on hot line side, of all components including complete weapons. Components already located are brought to final processing location at hot line. Marine and Navy team proceeded through hot line. Team located one complete half ring and five pieces of half rings. Also, located a radioactive piece of metal 8 inches long, 1/8-inch thick and from 1/2- to three-inches wide. Located two initiators. Team sent to check hot spot near VIP bleachers that was located by aerial survey. Team ordered to process through hot line without getting information on hot spot. Army EOD team proceeding through hot line. Continuation of RSP, including foam cure, completed on W-70 warhead. Warhead picked up by crane and delivered to hot line. Team returned to site but failed to find any other weapon components. Weapon components already found were transported to final processing point at hot line. 22AF EOD CP requested a listing of components processed/identified from PANTEX personnel so it could be determined which items were not accounted for. All EOD teams processed back through hot line and hot line closed for the day. EOD/DOE meeting to determine action for following day. Marine/Navy EOD team to search SW quadrant for target rings. Air Force EOD team to search for missing B-61 components. Army EOD team to search for missing W-70 components. EOD input for SITREP turned into 22AF DRF CP.

(7) Civil Engineer: Decontamination unit and tankers available for use upon activation of hot line entry point. Began site preparation for movement

of tents to new locations. Nellis AFB site developers arrived at approximately 0900. Tents were relocated by 1500 that day. It was determined on D+4 that Air Force site developers suited up in decontamination clothing, with M17-A1 mask, could not accurately use land surveying equipment inside the hot line. The problem was the eye piece on the M17-A1 mask which causes parallax and resulted in inaccuracies. Nellis AFB site developers were advised that they would be able to return home on Monday morning, D+5.

(8) Nellis generator arrives on a flatbed - 2800 lbs. Red Horse wouldn't release forklift to offload generator in support of exercise. Harvest Eagle (HE) supply officer agreed to take Nellis generator as backup to camp generators and let us use his wheeled backup generator in the morning. Red Horse agreed to offload the generator as camp backup. HE cannot use Nellis generator (30 KW required). After much discussion including referral to OSC, Red Horse agreed to upload Nellis generator onto ATRAP pickup truck.

(9) Additional hot line requirements for 100-150 mask inlet valve covers. Next higher assembly is M-17 mask. Nellis has no covers - sending masks.

(10) Requirement to prepare a recovery plan. Includes disassembly of aircraft.

(11) Camp operations were smooth except for the dust and high wind problems. The dust storm started at mid-day on D-3 and continued until the morning of D+5. Some tents were in disarray because of wind damage and had to be resecured. The requested KPs arrived at 1100 hours on D+4. Their added assistance made it possible to provide a hot evening meal on D+4. The U.S. Army contingent departed on D+4 with little difficulty and minimal impact on camp operations.

(12) Judge Advocate (JA): JA meets with Las Vegas Mayor/Councilman regarding accident-related business decline--advises them of claims procedures

through Nellis/JA. Sheriff arrives with State Court bench warrant for arrest of OSC for contempt of court by ignoring TRO. JA advises sheriff that OSC will not submit to state court arrest order and simulates notice thereof to appropriate authorities.

(13) 1930 - Daily briefing and planning session.

(14) 2200 - Prepare and dispatch SITREP.

<u>22 APRIL 1979</u>

PLANNED OPERATIONS	DAYLIGHT SAVING TIME
1. FINAL PLAN/BRIEFING	0630/1130
2. OPEN HOT LINE	0800
3. EOD: NAVY (4)/AF( ), B-43 CRATER, NE QUAD COMPONENT SEARCH	0830/1130
4. EOD: MAR (3)/NAVY (4), TAIL SEC/ TARGET RINGS	0900/1200
5. RADCON: ARMY ABERDEEN (3), HOT SPOT	0930/1200
6. RADCON: ARMY (6), NORTH HALF, AREA COVERAGE	0945/1245
7. EOD: ARMY, W-70, RSP CONTINUATION	1000/1300
8. PRESS CONFERENCE	1030
9. RADCON: NAVY (6, YORKTOWN), S.E. QUAD (STAPLEX)	1330/1630
10. MAR/NAVY, TAIL SECTION, TARGET RINGS	1400/1700
11. RADCON: ARMY ABERDEEN (3), S.W. QUAD	1430/1730

12. HOT LINE SCHED:

SOURCE	NR	
A.F.	6	0800
ARMY	6	1100
NAVY	6	1200

SOURCE	NR	
NAVY	6	1400
NAVY	6	1500

13. HOT LINE CLOSED 1800

14. DAILY SITUATION BRIEFING 1930

f. D+5 (23 April 1979)

(1) 0630 - Daily plan briefing

(2) Civil Engineer: Decontamination unit and 1500 gallon tankers available for use upon activation of hot line entry control point. Firm request for equipment (backhoe) was received for use inside the hot line area. Equipment with operator was available 45 minutes after request. The On-Scene Commander requested, in conjunction with the movement of the hot line entry control point, that a parking lot and turn-around area be constructed in close proximity of the new entry control point. A grader with operator was obtained for that purpose and the parking lot completed by 1430. Additionally, the engineering representative of the DRF was requested to prepare the Recovery Plan for the exercise. Recovery Plan was completed by 1800 on D+5.

(3) Established new hot line for processing components. Using general purpose tent over existing boundary. Temporary storage sites established on both sides. Security notified of additional close-in requirement.

(4) Security requested 2 each NF-2 light carts to illuminate processing area. Controller directed simulation and use of prepositioned equipment.

(5) Info: Sent letters to all mayors within 100 miles explaining health situation. Press conference - had experts from EOD, Lawrence Livermore, Los Alamos and Public Health. Laid tritium questions to rest. Conference interrupted by late arriving newsman with word of demand for congressional

investigation. Two prospectors appeared on scene claiming they had detected radioactive readings from their horses' hooves. Decon and public health were called for and the gentlemen were checked for radioactivity and found clean. Legal offered them claim service if it were found to be necessary. Whole episode was filmed by press.

(6) Judge Advocate: SPs stop horsemen at NDA border. JA confirms identity through sheriff, ensures contamination check of horses and riders, and provides claims advisement to horsemen. Media helicopter overflies NDA. JA/SP ensure Nellis/FBI/FAA coordinated intercept for examination of any filming conducted. OSC served Federal District Court TRO. JA simulates immediate TJAG consult and advises OSC to continue operations.

(7) EOD: Opened 22AF EOD Command Post. Air Force EOD team proceeded through hot line. Several weapon components found in vicinity of B-61 crater. Last remaining accountable component found and all items transported to hot line for processing. Marine/Navy EOD team proceeded through hot line to search southwest quadrant. One full target ring, two half target rings and four pieces of half target rings found. All components brought to processing point at hot line. PANTEX personnel inventoried all target rings recovered and reported that 2-1/2 half target rings and two generators were still missing. Team brought the intact B43 and all B43 components to processing line. Army EOD team proceeded through the hot line but could not find any other W-70 components. All EOD teams processed through hot line and hot line closed for night. EOD/DOE meeting to determine action for following day.

(8) Camp operation ran smoothly this day, primarily because the telephone system was completed and provided ready communication access to all agencies. The winds had subsided, vehicle support was properly organized and

the various teams and their leaders had adjusted to the camp operation and daily routine.

(9) 1930 - Daily briefing and planning session.

(10) 2200 - Prepared and dispatched SITREP.

<u>23 APRIL 1979</u>

<u>PLANNED OPERATIONS</u>

1.	EAT A HOT MEAL	0600
2.	FINAL BRIEFING	0630
3.	OPEN HOT LINE	0800*
4.	PANTEX AND SEAL BEACH, PROCESSING LINE	0800/1200
5.	MARINES (7), SW QUAD. TARGET RINGS	0830/1115
6.	AIR FORCE (4), B-61 CRATER	0900/1130
7.	ARMY, W-70 SEARCH	0915/1145
8.	ARMY ABERDEEN, N AND SE QUAD	0930/1200
9.	PANTEX	1330/1655
10.	MARINES, COMPONENT SEARCH	1400/1630
11.	AIR FORCE, B-61 CRATER	1415/1645
12.	TAKE A HOT SHOWER	ASAP

<u>HOT LINE SCHEDULE</u>

<u>SOURCE</u>	<u>TIME, DRESSED OUT</u> (SHOW 1-HOUR PRIOR)
NAVY (SEAL BEACH)	0800
MARINES	0800
CONCORD	1100
AIR FORCE/YORKTOWN	1500

*HOT LINE TEAM REPORT AND DRESS OUT NLT.

INFORMATION PRESS CONFERENCE	1030
DAILY SITREP BRIEFING	1930

g. D+6 (24 April 79)

(1) 0630 - Plan briefing (See Atch 1)

(2) This day was the smoothest operation of all. The transportation arrangements, communications, KP and Red Horse support all ran smoothly. Preparations were made for departure on the afternoon of D+6. Vehicles were loaded and dispatched by 1630 hours and their movement to Nellis AFB occurred with few problems. Upon arrival at Nellis AFB, the personnel and their equipment were well received and accommodations provided to all personnel. Airlift arrangements were accomplished on schedule with no specific problems identified

(3) EOD: Deployed combined Army, Air Force, Navy and DOE search team to recover remaining components. Team directed by DNA/NTS controllers. Only remaining components determined to be portions of target rings; all but three quarter pieces located. Navy decontamination team and PANTEX team completed most component decontamination, identification and packaging.

(4) Decontamination unit with 1500-gallon tankers available for use upon activation of the entry control point. Since the exercise was terminated at approximately 1100 on this date, "button up" of equipment and personnel was effected. All major components and vehicles were decontaminated prior to hot line termination. Helped close down Harvest Eagle. Attended out brief at Camp Mercury; returned to Nellis AFB by bus.

<u>24 APRIL 1979</u>

<u>PLANNED OPERATIONS</u>

1.	FINAL - FINAL BRIEF	0630
2.	OPEN HOT LINE	0800*
3.	PANTEX/NAVY - COMPONENT PROCESSING	0800**

4. HOT SPOT NORTH OF DATUM POINT - OEHL/DOE 0800/0930

5. HOT LINE FINAL CLOSURE 1030

6. WILL THE LAST MAN OUT*** OF HARVEST EAGLE CAMP PLEASE TURN OFF THE LIGHTS.

* HOT LINE TEAM REPORT NOT LATER THAN DRESSED OUT

** AS NECESSARY BUT HOPEFULLY NOT LATER THAN 1030

***DON'T LET THE TENT FLAPS HIT YOU IN THE ASS ON THE WAY OUT!!!

22AF/DRF

LOAD-OUT AND REDEPLOYMENT SCHEDULES

TUESDAY - 24 APRIL 1979

1200L - EXERCISE ENDS

1300L - MOBILITY GEAR TO WEST SIDE OF ADMIN TENT (BELOW FLAG) FOR PRE-PALLETIZATION. *PERSONAL BAGGAGE WILL GO IN M-35* TRUCK NEXT TO MOBILITY PALLET.

- SECURITY POLICE EQUIPMENT PRE-PALLETIZED (MAJOR SHELTON WILL ARRANGE AREA AND MANAGEMENT).

1445L - LOAD OUT FLAT-BED

1500L - ASSEMBLE CONVOY

1530L - DEPART FOR NELLIS

1800L - ARRIVE NELLIS - TO BILLETS

WEDNESDAY - 25 APRIL 1979

1630L - ARRIVE STAGING AREA WITH PERSONAL BAGGAGE. PERSONAL BAGGAGE WILL BE HAND LOADED ON BAGGAGE PALLET ON AIRCRAFT.

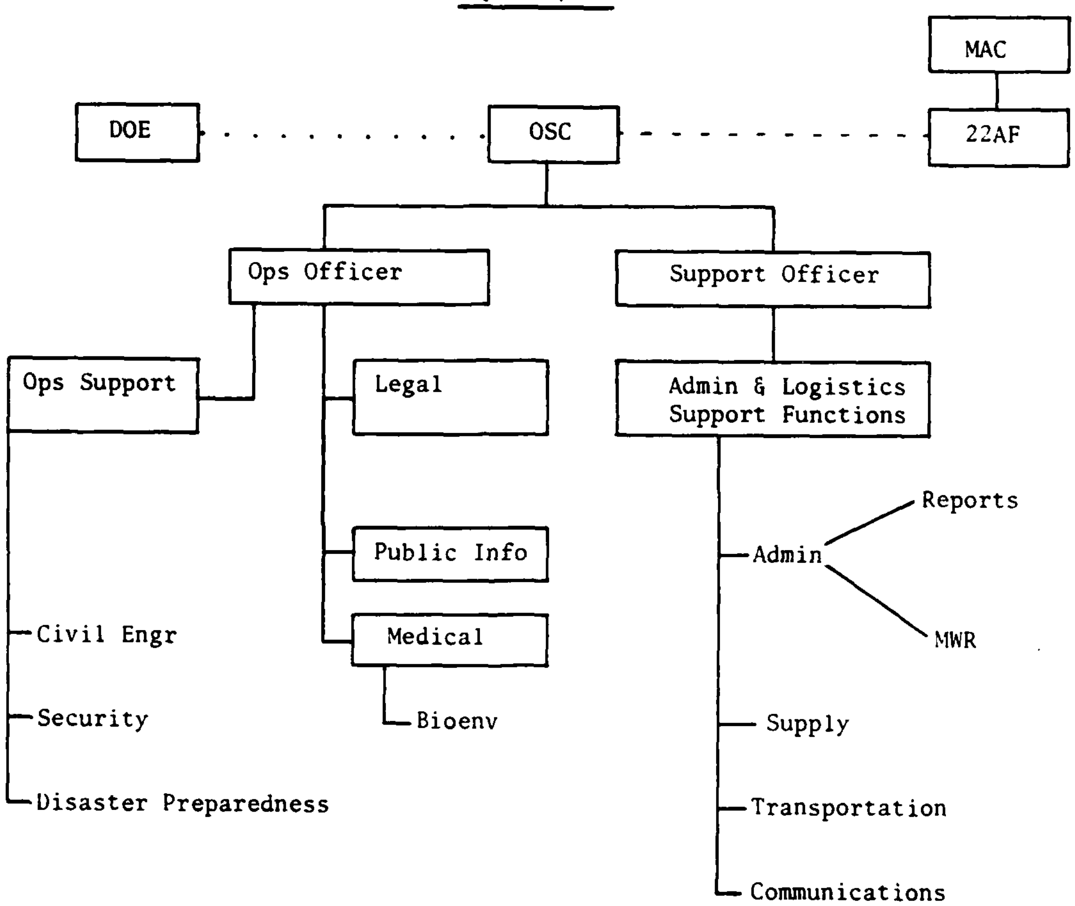
1800L - DEPART FOR TRAVIS

1930L - ARRIVE TRAVIS - EXERCISE ENDS - H O O R A H ! ! ! ! ! !

4. ORGANIZATIONAL STRUCTURE

(a) (Schematic)

HQ 22AF/DRF



Coordination . . . .

Command - - - - - - - - - - - - -

b. Manning: Total Strength - 76

On-Scene Commander		1
Ops Officer		1
Ops Support		66
Civil Engineer	5	
Security	46	
Disaster Preparedness	10	
Legal	2	
Public Information	1	
Medical	2	
Support Officer		1
Administration & Logistics Support Functions		7
Administration	3	
Supply	1	
Transportation	1	
Communications	2	

5. OVERALL SUPPORT PROVIDED FROM DOD/DOE RESOURCES.

a. Nellis was the primary source of our DOD support though vehicles were provided by Ft. Ord and Dyess and KPs by Norton AFB. Some concern was voiced by Nellis when our "Exercise" requirements threatened to impact on their "real world" mission; i.e., three site surveyors, 150 protective masks, KPs, etc., but most requirements were furnished promptly with delivery times of 6-1/2 to 21 hours after request submission.

b. A USAF Harvest Eagle kit for 500 personnel and associated vehicular and equipment support for food service, medical, POL, water, and general supplies.

c. Recreation equipment, including softball, volleyball, badminton, horse shoe kits, 16mm movie projector and films.

6. *PREPARATORY SUPPORT.* The Harvest Eagle kit was adequate for the 7-day support provided. For future exercises, recommend the tents be

provided with canvas floors. The food service tents should also be provided with liners to reduce the dust and dirt contamination problems. Also, a public address system for making announcements, paging, and safety should be provided.

7. COMMENTS ON OVERALL CONDUCT OF THE EXERCISE.

a. The overall exercise was a demanding test which validated some preconceived ideas and has questioned numerous other notions regarding our preparations for real world response. The capabilities of the different DOD/DOE teams that responded were effectively challenged. Most teams were observed to perform in a highly professional manner. However, our ability to combine the operations of all DOD teams into a cohesive joint operation was found wanting. Much work needs to be done here. Time compression, as previously mentioned, caused much unrealism in the planning and conduct of daily operations. Future corrective actions based on these findings must consider these factors.

b. The use of Ra-223 added a touch of realism which has never before been realized in exercise play. All DOD/DOE teams responded to this environment in a superb manner. During the preplanning phase, base disaster response force personnel eagerly sought positions on the DRF in order to work in this environment. This was considered their chance of a lifetime and a major factor in the total success of the exercise.

c. Due to insufficient number of support personnel, poor coordination, poor communications and the lack of a central command post, logistics requirements were passed through many channels, often without the knowledge of the logistics officer. Requirements were seldom anticipated and, when submitted, vague. Communications were almost nonexistent for the first two days and the logistics officer was unable to control the receipt and issue of items

requested. Teams from the various player organizations were not informed of mobility requirements and arrived without essential personal equipment. Despite all this, the teamwork displayed by our DRF enabled us to overcome these deficiencies and accomplish the mission.

d. Operation of the camp was a good training ground for the Harvest Eagle function. The erection of the camp in advance of the accident scenario was proper; however, the complete Harvest Eagle resources should be made available to the OSC when the exercise begins. All of the Harvest Eagle support teams showed excellent willingness to work long hours under adverse conditions. Their skills and willing attitude were key factors in the success of the exercise.

8. CONCLUSIONS:

a. The DOD and DOE possess a wealth of highly qualified personnel and systems. Prior to this exercise no one party was totally conversant with the full capability of the other to respond to a nuclear weapons accident. NUWAX-79 pointed out most forcefully the absolute need to develop plans to insure the positive, direct tasking and organizational alignments necessary for efficient operations. The current DOD/DOE agreement is broad enough to accommodate these actions. Revised 22AF/DRF plans will incorporate recognition of these capabilities.

b. Current 22AF/DRF team composition is inadequate to effectively respond to a nuclear weapons accident.

c. Current DRF training is inadequate for effective management of a nuclear accident situation.

d. MAC DRF does not possess sufficient organic communications, transportation, or personnel at any one location to efficiently manage a nuclear

accident situation. Planning must insure positive source selection to insure rapid qualified response. More planning effort should have been dedicated to the support function. Also, closer predeployment coordination with other players will reap dividends.

e. Current Air Force policy and equipment associated with radiation monitoring should be evaluated in light of realistic needs. Current Air Force team RADIAC equipment has once again proven unacceptable in the harsh environments where accidents seem likely to occur.

f. The engineering element of the DRF did not feel there would have been sufficient training/expertise available to have properly responded had there been no prior notice or preparation prior to the exercise. Obviously, the same comments are doubly true had it not been an exercise but the real thing.

g. NUWAX-79 was a demanding test in a harsh and realistic environment. In spite of severe limitations and restrictions, individual initiative, personal motivation and a strong desire to overcome all adversity assured a positive if not text-book solution to the problem.

9. LESSONS LEARNED.

a. Operations

(1) Establishment of a command post manned by key personnel during all times personnel are working in the field is essential. The command post must be manned by all functional representatives; i.e., operations, civil engineer, transportation, communications, supply, disaster preparedness, etc.

(2) No special preparations were made for assimilating the Department of Energy (DOE) functions into the DOD command structure. In this regard, a tent for a DOE work center should have been added to the other OSC staff functional tents.

(3) 22nd DRF did not conduct staff meetings where each functional manager could voice problems, opinions, progress, or suggestions. This could have expedited the early resolution of problems such as the coordination among units and assessment of overall capability.

b. Communications: Each major function should have communications from the command post to his counterpart in the field. The use of JACC/CP was an asset and will be to future operations, but it was ineffectively planned and utilized. Better use of land lines is essential. Inadequate communications forced a deviation from desired command post organizational structure. The use of non-tactical portable radios without base stations was a marginal proposition. These assets could not function properly as used and became less reliable with each day. Extensive long-range plans and equipment is essential. When employing joint service teams, as in NUWAX-79, a common communications net with all teams under the control of the OSC is essential. No team should be down field without communications to the central command post. Many of the exercise players had specialized communications requirements which had not been identified prior to deployment. For example, the DOE often needed access to commercial telephones, yet the nearest such phone was several miles away in Lathrop Wells. Other team members appeared with wire facsimile machines which are so sensitive to telephone line fluctuations that they could not operate over HF patches. Further, these machines required such a long period of time to transmit a single picture that they would have saturated our single satellite circuit. Some military players had to be sought out to determine if they needed any communications support, often they needed extensive briefings on our capabilities, and then were not sure with whom they needed communications.

c. Explosive Ordnance Disposal (EOD)

(1) Slow Down - Proper and complete damage assessment is a must even before Render Safe Procedures (RSP) are accomplished. A good damage assessment becomes more critical after the RSP has been accomplished and before the weapon is moved. Radiographs should be at least considered before the damaged weapon is moved.

(2) A central controlling agency for all teams is a must. A central plotting map for plotting all Disaster Preparedness Support Team (DPST) and EOD findings is necessary. This information has to be immediately available to DPST and EOD team chiefs to determine and coordinate their team's action.

(3) All security posts should be annotated on the same plotting boa so security personnel can be identified as authorized inside the hot line.

(4) A common communication system is a mandatory item. No team should be allowed to work inside the hot line without communications of some type.

(5) DOD personnel need better and more reliable RADIAC instruments. It is next to impossible to find buried radioactive components without good RADIACs.

(6) EOD tech orders need more information on component recognition and a list of components by M.C. number that have to be recovered.

(7) Nuclear Weapons EOD School at Indian Head, MD should place more emphasis on nuclear weapon component recognition during basic EOD school and subsequent refresher classes.

(8) A cadre of trained personnel should be formed to perform the duties of the On-Scene Commander and his staff. Most responding teams knew how to perform their jobs but few DOD personnel have been trained or have adequate knowledge of the different teams' capabilities and how to use them effectively.

This addresses all DOD and DOE teams and resources available to respond to a nuclear accident.

d. Radiation Monitoring (RADMON)

(1) Transportation: Lack of a transportation representative at the command post and a shortage of four-wheel drive vehicles resulted in delayed recovery action; also, the late relief of RADMON crews on several occasions. Provisions should be made to have heavy equipment and operators; i.e., cranes, $2\frac{1}{2}$-ton, front end loaders, etc., readily available for continuous operations during scheduled work periods.

(2) Equipment/Supplies:

(a) Consideration should be given to including the following items in the Response Force Kit.

1. 25 ea protective masks
2. 250 sets M13 filter (M13A2 not required in a radiation environment)
3. 200 ea inlet valve covers
4. 200 ea inlet valve discs
5. 20 boxes 2 inch masking tape
6. 500 ea Radioactive Contaminant Protective suits (if laundry decontamination facilities are not available)

(b) Using the new Chemical Protective Footwear cover (NSN 8430-01-021-5978), one size would fit all and booties could be decontaminated. These should also be included in the Response Force Kit (Ref para 9d(2)(a) above).

(c) All available military RADIACs should be pooled at a central location so the CAT and recovery personnel are aware of available instrument resources. Also, a complete listing of non-DOD equipment and capabilities should be compiled.

(3) Instrumentation:

(a) The PAC-1-S was subject to many breakdowns. At Palomares we learned the PAC-1-S was a fine laboratory instrument but of limited value in an open terrain survey. At Thule, we relearned this lesson. At NUWAX-79, we validated both previous observations. Recommend an evaluation of the LUDLUM 101* instrument as a replacement for both PAC-1-S and PDR-27. This instrument has alpha, beta and gamma detection/measuring capability. It has a rugged appearance and does not convey a high cost appearance. This unit saved the day for two or more EOD teams in recovery of critical items that were buried and undetected by instruments presently in the inventory.

(b) The FIDLER is far superior to any instrumentation now available to Base Disaster Preparedness personnel. It is estimated proper use of the FIDLER would decrease the time required to conduct surveys by 75 percent.

e. Security

(1) National Defense Area - Entry control requirements were too stringent for the situation. The DOE badge issued to all participants was sufficient. A check of another identification credential to support this badge could have been accomplished as an interim procedure. As the sentries became familiar with everyone the combination of badge and personal recognition would have sufficed. Use of entry authority lists was not necessary. The entry authority list plus an additional badge issue really slowed the process. Everyone had to go through this procedure twice each day. This consumed entirely too much time. The delays amounted to 30 minutes or more.

(2) Hot Line - Entry control was appropriate. The exchange badge was good. Keeping the individual's military identification credential insured that an accurate count by name of people "down range" could be accomplished.

*Ludlum Measurements Inc., P.O. Box 248, 501 Oak St., Sweetwater, TX 29556.

(3) National Defense Area - Authority to establish a National Defense Area made the difference between control of the situation and noncontrol. As a result, it was impossible for the Military Police to gain control of personnel and vehicle circulation. Use of stanchions, signs and nylon rope to delineate the boundary of this area greatly eased the task of the security police.

(4) Vehicles - We did not have enough. The absence of a repair and service capability really hurt. Commercial trucks, two and four-wheel drive versions, probably would have served us better than their M-series counterparts.

f. Information

(1) We need better coordination and more resources to use outside the crash site. Presently, Public Affairs Officers and On-Scene Commanders are not trained or prepared to properly handle the press and rumors which would sweep any area near a nuclear accident site. The public perception of the dangers to their health and what is being done to protect their health is just as important a consideration as locating and disarming weapons. Any response force has two tasks in the event of a nuclear accident. Not only must they deal with locating weapons and radiation problems, they must also deal with the perceptions of the public. Both these tasks must be accomplished if the operation is to be a success.

(2) Information Officers need more training in basic nuclear facts of life. The average citizen only knows bad things about nuclear energy. The little knowledge they have is usually inaccurate and can create severe problems and possibly even panic in the event of a nuclear accident. A combined team of public health, nuclear physics, legal, and information experts must aggressively pursue the matter of public health protection and education outside

the cordon area. They cannot wait for problems to appear - they must go out with a public health sampling program before the public asks for one. The public must have the perception that the disaster response team is doing all it can or there will be panic.

g. Logistics/Supply

(1) A minimum of two supply NCOs need to be assigned to the logistics function.

(2) Every effort must be made to have supply representation at each evening's planning meeting. Supply must bring out each function's estimated requirements. Following the meeting, supply should call in all requirements which can't be filled by on-hand assets for overnight processing and delivery prior to the next morning's start.

(3) Basic maintenance capability must exist - especially in the automotive and electrical areas.

(4) Supply needs are masked because each team brings its own supplies. The DRF supply chief must contact each team early to determine total on-hand assets available and estimated demand at each milestone.

(5) Any initial tasking message must include the details of billeting and support arrangements and identify all personal equipment to be brought.

(6) A loud speaker system is essential in any tent city for quickly locating personnel and for keeping everyone informed.

(7) The camp support staff was inadequate because the initial staff was sized for a 12-hour-per-day camp operation, when in essence, it operated for more than 17 hours per day. Also, the camp functions of a billeting office and motor pool were not provided for.

(8) Total control of vehicles should be by the On-Scene commander and delegated to the transportation officer. As it was, each service retained their vehicles; thus many were unused during long periods and personnel transportation was hindered.

(9) A more rapid or direct use of vehicles was needed to transport personnel from the base to the crash site.

h. Civil Engineer

(1) Requests for material, equipment, and personnel should be issued by one individual in the command post with authority to eliminate duplicate requests.

(2) Coordinating working hours with dining facilities to eliminate problems is an essential On-Scene Commander responsibility.

(3) Radials should have first priority to be staked out to aid RADMON team in accurately locating hot spots (after area has been declared safe by EOD personnel).

(4) Plotting was duplicated which resulted in inappropriate grid maps (radials, etc.) and inaccurate locations of aircraft parts, craters, etc. This was due to lack of direct aerial photographs which are a must.

i. Medical

(1) Environmental staff requires a dedicated vehicle for transport of equipment and personnel to remote sites around the crash site.

(2) Staff meetings were not adequate for discussing the problems or encouraging team work among the staff.

(3) A coordinated radiological health plan addressing levels of decontamination, final disposition of contaminated waste, protective equipment, etc., needs to be developed for initial field use.

(4) The M17A gas mask employed by DOD is not the best choice. Numerous commercial brands that offer improved visibility, easier cartridge interchange, and improved operational parameters can be used.

10. RECOMMENDATIONS.

a. General: As discussed in the initial critique, it appears appropriate to establish a centralized, specialized team of DOD/DOE experts trained and equipped to handle nuclear weapons accidents. The general skills, equipment and capabilities demonstrated during NUWAX-79 were at their peak only because of intensified training pointed at this exercise. Ordinarily, these teams (Army NAIC and NAF/DRF) are dedicated to other higher priority pursuits with this important responsibility as an additional duty. Normal attrition will quickly erode the high degree of experience recently acquired. Strong consideration should be given to identify an organization or organizations more routinely associated with this problem and currently equipped with the latest equipment best suited to this task. The DOD organization in possession of the weapon should be charged with providing support as outlined in current directives and agreements.

b. Operations: NAF/DRF organization, manning and procedures must be greatly expanded to fully cope with the potential nuclear accident. Immediate steps will be taken to incorporate lessons learned in revised plans.

c. Training: NAF/DRF personnel must receive formal training such as that provided by the Interservice Nuclear Weapons School and they must be exercised, realistically, on a routine basis to insure proficiency.

d. Recovery Procedures: Recommend the following actions be incorporated into USAF recovery operation:

(1) Upon receipt of an OPREP-3/Pinnacle, Broken Arrow, the NMCC should immediately order aerial photo coverage of the accident site. Definition should be acute enough to clearly define a six-inch object. Coverage should include the datum point and adjacent area up to 10 miles diameter.

(2) Simultaneously with the above event, the NMCC should request Lawrence Livermore Laboratory to implement ARAC plotting.

(3) As a third action, the NMCC should request Los Alamos Scientific Laboratory of impending requirement for Airborne Radiac Survey (EG&G), and when practical establish the desired time for survey to be accomplished.

(4) Radiac monitoring would commence after EOD RSP and ARAC/Aerial Radiac Survey data had been plotted on the aerial photo. Gross radiac monitoring of this plot would be accomplished by FIDLER. Finite grid search, if required, could be detailed to more sensitive instrumentation, such as the LUDLUM 101.

(a) Rationale: Radiac search with PAC-1-S results in many back-breaking hours in nonproductive quadrants. Based on observation at NUWAX-79, by conservative estimate, the ARAC plot eliminates 3/4 of nonproductive area search. The Airborne Radiac corroborates and defines initial rad line(s) - also identifies isolated hot spots. During NUWAX-79, a FIDLER team of three (2 instruments, 1 recorder) completed the survey, in 45 minutes, of an area only partially covered the previous day by a qualified 6-man team with PAC-1-S instrumentation. The LUDLUM 101 instrument is more compact, lighter weight and not as delicate as the PAC-1-S. In addition, it has alpha, beta and gamma monitoring capability by selection. Highly recommend this instrument be impartially evaluated as replacement for both PAC-1-S and PDR-27.

e. Information

(1) The information team should be enlarged. A minimum of three highly qualified information people and one well qualified administrative specialist are needed to handle all the public information and community relations functions of a nuclear accident.

(2) Information, legal, public health and nuclear experts should be combined into a joint task force for outside-cordon activities. This group's efforts should be coordinated to provide a prompt, aggressive, educational and informational program to let the public know what hazards are present, and what the task force is doing about them. This group should not only pursue the public health aspect in the immediate area but any communities nearby as well. The disaster response force must initiate every possible action to calm public fears and keep the public informed.

(3) Communications and transportation support for the out-of-cordon teams must be provided - even if commercial and rental facilities must be used. The effectiveness of the operation should not be limited by having to rely on in-house equipment.

f. Support

(1) Recommend that the exercise be broken into 2 phases; the initial response phase, and the recovery phase. During the initial response phase, the camp site should not be made available to the initial response force and they should be required to take their initial actions and provide for their own welfare at the same time. However, during the recovery phase, the camp site should be made fully available and be in complete and full operation. In an actual situation, after the initial response actions are complete, several days would be made available to organize the camp before extensive recovery actions were begun.

(2) Recommend the camp operation be conducted by a single camp commander and staff, from a single DOD support function reporting directly to the OSC.

(3) Recommend the camp staff be sized for 16-hour days with the billeting, motor pool and security functions operating 24 hours per day.

g. Medical

(1) The hot line entry-exit medical log should be accomplished by a 907XO and 902XO. A first aid station should be positioned near the hot line.

(2) A minimum of six STAPLEX air samplers with power sources and filter paper sufficient to run 30 days must be on hand.

(3) Two vehicles dedicated to environmental functions and one crash ambulance equipped with radios are needed.

(4) Three 24-hour composite water samplers are required.

(5) A consensus decontamination standard is needed for both personnel and equipment.

(6) Area maps delineating crash, populated areas, private property, major roads and surface water sources is a necessity.

(7) EOD and radiation data must be channeled to health physicists daily.

(8) OEHL should provide health physicists and bioengineering support.

(9) One individual should be designated for overall hot line/crash site operations. All activities within the hot line, including EOD, radiac monitoring and environmental monitoring must be under his control.

h. Communications

(1) In a real accident, MAC should immediately establish an emergency contract with the local commercial telephone company to install private telephones as near to the hot line as possible and in the command billet. A few pay phone booths should also be provided for personal calls. This would enable

many non-DOD agencies to contact their contemporaries and also provide us with a backup should our DCS fail. This concept should also be exercised in at least one future NUWAX.

(2) The intrabase radios used by the On-Scene Commander did not have enough range to allow communications between the Harvest Eagle command tent and the crash site. It was also difficult to contact individual subscribers due to constant, but necessary, radio chatter. The next deployment should include a 25-watt base station with a more effective antenna. The 22AF/DRF should consider the purchase of such a base station with selective tone paging and about nine, five-watt, portable intrabase radios with four to eight frequency capability. These radios and the base station should be crystallized to the eight standard MAC ALCE 413.XXX MHZ frequencies. These assets may be immediately loaned to 21AF should the incident occur in their theater. We had a very difficult time trying to borrow the necessary intrabase radio assets from the wings.

(3) There were literally dozens of incidents in which phone calls were placed to the Harvest Eagle command tent asking for an individual who could not be located. This disrupted other operations while a worker was diverted from important duties to search for the individual. Further, there was no means of mass communications if an emergency arose. A small AC/DC public address system with approximately four outdoor horn speakers would have solved all the above problems. Strongly recommend one be purchased or borrowed by the 22AF/DRF. In addition, a small self-contained hand-held bullhorn would have aided several operations at both sites.

(4) The Exercise Control Staff stated they monitored every one of our radio frequencies. This plainly demonstrates that any outside faction, such

as reporters or activists, may also monitor our security, civil engineering, or On-Scene Commander's intrabase radio net. It is imperative that these nets be protected from this exploitation, if not for COMSEC purposes, then for physical security reasons. Radios should be secured by either a COMSEC (National Security Agency) approved system or, more realistically, a private device such as Motorola offers for its intrabase radio portables.

(5) Although HF radio can provide communications for medium distances, no amount of power can ensure it will be completely reliable over several thousand miles during poor propagation periods. As a result, our primary means of communications to the DCS, the JACC/CP HF system, did not fully meet our expectations. All calls over this system had to be patched through a single manual switchboard at McClellan, were half-duplex, and suffered from low volume and high noise. This was a far cry from what we would have had if reliable contact had been made with Norfolk. Every effort should be made to equip a nearer DCS entry point with the necessary AUTOVON circuits and FTA-28 interface devices so we can be assured of more reliable communications. In addition, more emphasis should be placed on the WSC-3 satellite terminals. Although the JCSE has only nine WSC-3s, we can expect that in a real crisis we would be able to obtain four for our use, giving us two half-duplex channels (1 voice, 1 TTY). The WSC-3 is extremely reliable, can be quickly set up or easily moved, and with a Parkhill device is the only means of secure voice available between the field and the DCS. The establishment of permanent WSC-3 type ground terminals at both numbered Air Forces with DCS AUTOVON interfaces via their tactical switchboards should be considered.

(6) The exercise players had a far greater need for local telephone communications than was anticipated. Tasking should ensure that either JCSE

or AFCS provide a field telephone system of at least 20 subscribers and two switchboards plus operator and maintenance personnel.

i. Transportation

(1) In initial correspondence and telecommunications with Nellis Transportation and Planning Agencies (22AF/TRM message 210030Z Mar 79 - Subject: Transportation Support for the 22AF Disaster Response Force (DRF) and Equipment), there was a stated requirement for one staff vehicle, two 6-passenger pickup trucks (4x4), three 6-passenger trucks (4x2), two 29-passenger buses, and two 603X0 personnel to augment the team. This was later expanded to include a requirement for six M-151 jeeps and two M-35 trucks to support the 22AF/DRF Security Police contingent. It was agreed later that the sedan orginally required could be replaced with one additional M-151 jeep. These requirements were restated in the 22AF Supplement to the NUWAX 79 Exercise Plan, Annex K, para 6, Ground Transportation. And finally, this was spelled out in the exercise frag message sent 18 Apr 79. It was proven through exercise play that had these vehicles been provided, additional vehicles from other sources would not have been required. Initial vehicles supplied to the Disaster Response Force included one M-151 jeep, one AMC jeep carryall (4x4) rental vehicle, one 6-passenger pickup (4x2), and two buses. Additional support was provided in the form of two rental pickups used to transport Class A and Class C explosives, one additional bus which was shared with members of a Navy EOD team, and one 40-foot flatbed trailer used to transport equipment to the exercise site. Vehicles were to be provided to the 22AF/DFR at planeside at arrival time. It was a full two hours and 15 minutes after block-in before all vehicles were ready to convoy to the exercise site. An additional requirement, stated early in exercise planning, was the need for a listing of

the vehicles by type and registration number, that had already been assigned to other players in the exercise, to be furnished the 22AF/DRF-TR at planeside for use at the exercise site. The listing provided was a xerox copy of a hastily constructed list which included vehicles that proved not to be at the exercise site at a later time. The listing was very sketchy, lacking in detail, handwritten, and in some cases, hard to read. A final requirement was for the vehicles provided to each have a trip pack including the necessary forms and POL Servo-Plates. In addition to the individual vehicle kits, there were to be two Standard Forms 141, U.S. Government National Credit Cards, to be provided for off-base POL. The POL Servo-Plates were attached to the keys and, for the most part, AF Forms 374 were provided. Maps to the exercise site consisted of roughly drawn lines on a single sheet and accident forms were not provided. The National Credit Cards were not available. Recommend that equipment and paperwork requested in support of follow-on exercises, and most especially actual accident responses, be furnished as requested. They must be available at planeside, especially where advance notification is afforded. If necessary, funding must be identified in the initial frag message to provide for vehicle rental where adequate vehicles are not available through supporting base resources. A vehicle recall list, normally established for other base response plans and requirements, should be considered as a prime supply possibility.

(2) It became evident very early at the exercise that there were too many vehicles involved in the exercise, assigned to individual units, which for the most part were under utilized. Each unit arriving at Nellis acquired a vehicle to proceed to the accident site and once at the site these units were jealously guarded by the units as their own rather than as an asset to be used collectively for the more efficient operation of the entire camp. An attempt was

made late in the exercise to change this situation, however, at that point was "too little too late." Recommend that TR, on arrival at the accident or exercise site, establish control of all vehicles entering and leaving the camp. The best way to accomplish this is to institute a vehicle checkout format on which a verification can be made that the vehicle is authorized for use by the agency or individual in possession of it. This verification should be on a standard form listing the name of the agency authorized to use it, the time period of the authorization, and provide a place to validate the form. A checkpoint should be established by the Security Police at the entrance to the camp area and all vehicles entering and leaving the camp would be required to have this authorization. Those found without proper authorization would be referred to TR to obtain same. In addition, all agencies should be informed of the requirement for close coordination of transportation assets and requests be worked with TR. To further reduce vehicular congestion within the camp area and at the exercise site, a shuttle bus system should be established.

(3) Vehicles required for movement of the JACC/CP communications system and JCSE personnel from Indian Springs to the exercise site as originally coordinated in the planning cycle were not available at the offload. Because of this, the communications systems necessary to provide adequate support to the camp were delayed in being set up, and requests for support from off-site locations had to be accommodated by messenger and were late in being answered. As previously stated, vehicles must be made available for transportation of equipment at the air head as requested by the DRF. Without this support, actions necessary to the efficient operation of the camp cannot be taken on a timely basis.

(4) One of the biggest problems encountered during the exercise was at its conclusion when the members of the separate teams were breaking up and attempting to finalize or revise transport back to their stations. One officer, the 22AF/DRF-TR, had to coordinate the changes to previously scheduled SAAM support. Each individual team was highly interested in the how, when, where, etc., of their lift back to home station. With the limited communications and number of agencies involved in coordinating changes, it became a major undertaking to accommodate each of the team's desires. Coordination was required with the 22AF Crisis Action Team, the MAC ALCE at Nellis AFB, supporting agencies at Indian Springs AFS, and the various SAAM offload stations. A major contributor to the success of fairly timely response to the units was the assistance of the Exercise Umpire Staff MAC Liaison Officer. Recommend one 602X1 and one 605X1 be made available as a part of the DRF-TR staff to assist in coordinating wrap-up actions. These personnel would speak to cargo and passenger movement and would assist TR in assuring coordination with agencies concerned.

(5) It became apparent at the end of the exercise that there was a general feeling of "Get-Home-Itis." After a major group of the personnel had departed the camp for the wrap-up briefing, there were cleanup actions required which included cleanup of the administrative tents, retrieving additional equipment, and movement of broken vehicles. Recommend a definite plan for time-phased and action-oriented closedown of the camp be established well in advance. Each individual should be made well aware of his/her requirements prior to departure.

(6) There was a definite need established early in the exercise and an affirmed exercise play to establish a centralized location to be used as a

command center. Representation from the DRF staff and adequate communications to and from the user and staff operating locations through a centralized command center would have improved command/control immeasurably. Recommend as the first item of business during any future exercise or accident response, a camp command center be established with adequate communications to function as a true coordinating agency. All representatives must be consolidated rather than collocated.

4. NAVY: The following is the Navy After Action Report in its entirety.

1. NAVY-MARINE CORPS ORGANIZATION AND RESPONSIBILITIES.

a. Title: Navy-Marine Corps Accident Response Element (See para c, below).

b. Mission: To render weapons safe, conduct radiation surveys, recover and decontaminate components and, as directed by the OSC, perform other actions to minimize injury, loss of life, or other consequences of the accident.

c. Size: The Navy-Marine Corps Accident Response Element for this exercise consisted of a Navy-Marine Element Commander (NMEC), four 4-man EOD Teams and four 6-man RADCON Teams drawn from the Naval Commands/Activities listed below:

Command/Activity	Team	Personnel
Naval Surface Force, Pacific San Diego, CA	NMEC	1
Explosive Ordnance Disposal Group One China Lake, CA	EOD	4
Explosive Ordnance Disposal Group One Hawthorne, CA	EOD	4
Explosive Ordnance Disposal Group Two Ft. Story, VA	EOD	4
First Force Service Support Group Camp Pendleton, CA	EOD	4
Naval Weapons Station Concord, CA	RADCON	6
Naval Weapons Station Seal Beach, CA	RADCON	6
Naval Weapons Station Yorktown, VA	RADCON	6
Marine Wing Weapons Unit 3 Marine Corps Air Station Yuma, AZ	RADCON	6
Total		41

d. Equipment:

(1) General: EOD teams of the Navy-Marine Accident Response Element responded with EOD tools, protective clothing and gas masks, radiac instruments, technical publications, and other equipment necessary to perform the USN-USMC exercise mission as defined. In addition, they also brought bedrolls, mess gear, and personal items needed to subsist in Harvest Eagle, the tent city provided by the Air Force. EODGRUONE, China Lake, and EODGRUONE, Hawthorne, responded by road with the vehicles and equipment they would normally use in responding to a nuclear accident. EODGRUTWO, Ft. Story and FIRST FSSG responded with vehicles and equipment similar to the teams from China Lake and Hawthorne, but were airlifted from their respective bases to Nellis AFB. They then proceeded to the accident scene in their own vehicles.

The RADCON teams that responded to the accident exercise were made up of personnel who are normally responsible for coping with nuclear accidents on or near their respective stations. They consisted of military (officer and enlisted) and civilian personnel. Their primary mission for NUWAX-79 was to conduct radiation surveys, man the hot line, and assist in the recovery, decontamination, and packaging of material. Hence, they responded with radiac instruments including a STAPLEX air monitor, protective clothing and masks, hot line equipment and other items paramount to performing their mission as defined. They too were to be housed in Harvest Eagle and brought appropriate personal effects. They were airlifted to Nellis AFB where they were provided ground transportation to the accident scene. Their equipment was palletized for airlift and they brought no vehicles.

(2) Communications: Eight AN/PRC-68 hand-held transceivers, provided by the USMC, were used by the USN-USMC RADCON teams in lieu of those they

would normally use. This was preplanned in order that the frequencies on the Nevada Test Site would be coordinated. EOD teams came equipped to establish telephone communications between the hot line and EOD personnel inside the cordon.

e. Capabilities: USN-USMC EOD capability at NUWAX-79 was equivalent to the capability these teams maintain on a day-to-day basis at their home stations. They are equipped and manned to perform EOD procedures on all nuclear weapons. USN-USMC RADCON capability at NUWAX-79 was geared to the exercise and the preplanned participation of the USN-USMC. The RADCON capability at NUWAX-79 was also equivalent to the capability maintained at home stations; however, the total accident response capability at home stations is much greater and includes such other response aspects as security, public affairs, medical, legal, etc.

SECTION D

EXERCISE EVALUATION/ANALYSIS

1. COMMAND AND CONTROL (REMOTE):

a. Procedures.

(1) During the initiation of the accident exercise, information concerning the aircraft accident was exchanged in a timely manner between the "Fort Mercury Army Command Post" and Nellis AFB. This information was provided to HQ, 22nd Air Force, Travis AFB, and a Crisis Action Team (CAT) was formed within 5 minutes. Concurrently, the elements of the 22nd Disaster Response Force (DRF) were also being assembled. Staff interaction between the 22nd AF Command Post and the HQ, MAC Command Post during the period 0945 PST and 1015 PST, combined with the OPREP 1 and OPREP 2 messages from Nellis AFB provided sufficient information for the joint decision at 1015 PST that a Broken Arrow incident had, in fact, occurred. Between 1030 and 1045 PST, information concerning the probable location of the crash site was exchanged between the Sixth Army Emergency Operations Center (EOC) and the 22d AF Operations Staff. As a firm location was not known at that time, operations personnel at 22nd AF used the relative location information (distance and azimuth data) provided by Nellis AFB to provide relative coordinates for the Sixth Army EOC.

(2) The main involvement of the major headquarters was initiated by a conference call between the NMCC, operations staffs of the Army, Navy, and Air Force, and the Department of Energy Emergency Action Coordinating Team. Elements of the Joint Nuclear Accident Coordinating Center (JNACC) for the DOD and DOE had been alerted to the potential Broken Arrow situation and were able to respond quickly in notification of the organizations concerned. The conference call involving all major headquarters and commands clarified the

command and control relationships that the exercise was to test. However, some misunderstanding did occur between NMCC and DOD/JNACC regarding authorization to deploy the response teams.

(3) The JNACC elements, both DOD and DOE, were used extensively during the first 2 days. There appear to be different concepts of operation of the JNACC as perceived by the DOD and the DOE. After arrival on site, the DOD elements were coordinating through the NMCC and Service headquarters, with follow-on tasking then proceeding from the NMCC through JNACC. The DOE/ARG elements were placing both a coordination and information center mission on the DOE/JNACC which required additional coordination between the DOE/JNACC and DOE/EACT prior to the DOE/JNACC contacting the various DOE laboratories and facilities. The relay of information to DOE facilities by DOE/JNACC was not always timely and consistent in the early stages.

b. Communications.

(1) Communications between the on-site forces and the various remote headquarters were difficult during the first few days, with a majority of the DOE communications between the accident site and the DOE/JNACC being through a local pay telephone in Lathrop Wells, NV. DOE/EACT gave serious consideration to the deployment of the DOE/NEST communication assets to support the DOE senior representative at the site and would have had this equipment not been in use in Pennsylvania supporting the Nuclear Regulatory Commission (NRC) activities at the Three-Mile Island Power Plant.

(2) Advisory information concerning the expected arrival of different response teams at the accident site, as well as status information on their actual arrival, was scarce at the remote headquarters. Frequently, the only information concerning some of the specialized teams came when their work was

included in the periodic situation reports. Reviews of numerous messages from the exercise site to off-site locations and headquarters indicate that some confusion exists on the correct levels of security classification for exercise traffic. Some remote locations, as well as several of the response forces, do not have access to the DOE Security Classification Guide for Nuclear Weapons (CG-W4). In normal situations, for example, NAIC headquarters and units would not require this access. Instances arose during the exercise where information sent by different means was marked with different levels of security classification. A more consistent classification review should have been conducted on the message files and logs for the exercise.

c. Recommendations.

(1) Perception of the mission and functions of the DOD and DOE/JNACC differs between the various facilities and headquarters. Clarification is needed.

(2) Many different agencies and activities provide response teams. Basic descriptions of their capabilities should be provided to the major operations centers and the OSC in planning and guidance documents, then deployments modified as necessary for each accident.

(3) Services commonly use different maps and charts for routine operations. Major operations centers should review their ability to standardize or cross-reference location data.

(4) Additional DOD/DOE coordination is needed on classification of weapon data messages during accidents.

2. ON-SCENE COMMANDER (OSC)/PLAYER ACTIONS:

a. Administration. Numerous unusual and complex technical problems arise in a major weapon accident for which specific procedures or prior training do

not exist. For timely action, problems must be recognized and assessed rapidly and the appropriate response capabilities recognized and utilized. The response force staffing should be reviewed to determine whether adequate support is provided for the OSC for coordination of diverse units, for thorough briefing and debriefing of individual teams, and for prompt information flow - horizontally and vertically.

b. Medical, Radiological Health Physics, Bioenvironmental.

(1) Observations

(a) The initial response team had a staff physician and two medical technicians stationed outside the hot line collecting nasal swabs for radioactive analysis. No attention was given to the environmental factors affecting the health of the in-cordon or the hot line workers. The team who relieved the initial response team also needed some prompting to provide such things as potable water and shade for protection against the desert sun and heat, a latrine at the hot line, eye protection from blowing sand, and to check the in-cordon time of workers.

(b) The search for and recovery of the seven casualties was unsatisfactory due to delays and incorrect priority of tasks on initial response. The search on D-day only found five bodies with two left unaccounted for. No real effort was made to find the remaining two as night fell, and all bodies were left in the accident areas with no effort to identify or remove them.

(c) The various specialized radiation teams individually did excellent work and demonstrated knowledge and training. The missing element was single management of their combined efforts. For example, due to lack of coordination, FIDLER instruments belonging to different teams were not set up to detect the same radiation energies. This caused monitor readings that were

not comparable and added to the problem of creating an adequate radiation plot.

(2) Health Physics

(a) All groups that worked on the hot line generally applied proper procedures on checking workers going in and coming out of the hot area. Monitoring was done well and the removal of Anti-C clothing was done in the proper sequence. The decontamination of casualties on D+2 was thorough and effective. Initially, the bagging of contaminated protective clothing was accomplished using single plastic bags. This proved inadequate due to tearing, and a switch was made to double bagging.

(b) Decontamination of personnel was done in the buffer zone in the open. The capability existed with the DOE equipment available to decontaminate persons under shelter (shower, sinks, hot water, and detergents), but it was not used, evidently because the capability was not known to the hot line supervisor.

(c) Equipment (masks, badges, tools, instruments, documents) coming from the hot area passed across the hot line to a special area set aside for monitoring and decontamination. This worked very well and two RADCON personnel worked this aspect full time.

(d) For the most part, health physics procedures were good. There were no serious inadequacies that would jeopardize the health of workers. The major problem was in the area of command. Health physics, bioenvironmental, and radiation control are closely related activities in the response to nuclear weapons accidents. The integration and management of these functions at NUWAX-79 was inadequate and resulted in confusion and failure to complete an evaluation of the radioactive contamination. The radiation plot available at D+6 had apparently not been analyzed nor reviewed by a health physicist or bioenvironmental engineer.

(e) Many in-cordon player personnel donned Anti-C coveralls and, for various reasons, were delayed entering the cordon. They were then seen in the Harvest Eagle village wearing the Anti-C coveralls in the dining area and other community areas. Although these Anti-Cs were not contaminated, it is poor hot line discipline to allow the wearing of Anti-Cs away from the contaminated operational area.

(f) The response of the USAF Occupational and Environmental Health Laboratory was excellent. Due to the poor overall radiation control staff operation, this team's capabilities were not optimally utilized. Their FIDLER monitoring capability was not fully utilized until D+5. Use of FIDLERs for mapping contamination patterns is far superior to other instruments. They are faster and, if calibrated properly, provide better information. They are also less apt to be damaged. Aerial survey is also invaluable in outlining contamination extent. It should be called for immediately to establish an exclusion area.

(g) The environmental sampling (air, soil, and water) program was instituted beginning on D-day. By D+4, the environmental sampling program had gathered convincing evidence that there was no threat to public health and that the contamination was confined to the accident site. The LLL on-scene laboratory capability was essential to this initial environmental assessment. This assessment of possible health effects surrounding the accident location was an excellent DOD/DOE combined effort. However, more planning and attention needs to be given to a coordinated bioenvironmental program on-site.

(3) Recommendations

(a) Service and DOE doctrine and training should include the requirement

to establish a single, senior staff officer to be in charge of all radiation control activities for the disaster response forces. The elements under this officer should include at least the following:

- o Hot line teams
- o Radiation monitoring teams
- o Radiation instrument repair team
- o Laboratory analysis support
- o Environmental sampling teams
- o Decontamination teams
- o Health physics consultants
- o Protective clothing program
- o Biological sampling and dosimetry programs

(b) He should also be responsible for determining the radiation safety qualifications of personnel entering the hot line, for rad safety briefings, and for the issue, fitting, testing, and sanitizing of respiratory protection for personnel not already equipped. The overall radiation control officer should hold staff meetings daily with all sub-team chiefs and coordinate all activities of the individual teams. Status information should be maintained on equipment, qualified monitors, protective gear, sample results, radiation plotting, etc.

(c) Protective masking guidelines for levels of radioactive surface contamination for plutonium are not standardized in Service and DOE directives. There are significant differences between Services and within each Service in this regard. A consensus should be reached between DOD and DOE for a common plutonium contamiration standard and all Service and DOE directives should be changed accordingly.

(d) There were differing opinions among DOE and DOD experts on where the film badge should be worn relative to the Anti-C overalls. Some EOD directives state exterior wear. However, there are general statements in Service dosimetry directives indicating the film badge dosimeter should be worn underneath any protective garments. DOE and Service directives and training should specify wear of the film badge inside the Anti-C suit at chest level. This will prevent contamination of the badge holder and still measure the beta dose.

(e) OSC should have a strong leader and knowledgeable individual on his staff who will command the medical facilities and the bioenvironmental effects elements. These elements have the responsibility for maintaining the health of all personnel working for the OSC.

(f) The military should study the use of the M-17 mask with canteen drinking feature to determine if it is adequate in a plutonium environment. Also, the use of canteens in the hot area is not a good health physics practice.

c. Logistics.

(1) Observations

(a) A total of 32 SAAM missions were flown by the Military Airlift Command (MAC) in support of NUWAX-79. There were no significant problems encountered in movement of the specialized equipment and accident response teams that were provided by the Services and the Department of Energy (DOE). Missions were preplanned through close coordination between MAC and the exercise planners. This introduced an exercise artificiality but insured the arrival of the response teams and equipment in a timely manner. Two on-call airlift missions were requested by the On-Scene Commander (OSC) and flown in direct support of the exercise.

(b) A Harvest Eagle package, which was supplied by Robbins AFB, GA, was erected and maintained by organizations from Nellis AFB, NV. A Field Food Service was established prior to D-day and maintained by US Air Force and Air National Guard personnel. Various camp organizations (USAF, U.S. Army, Red Horse, and U.S. Navy) jointly supported the field kitchen by providing personnel as mess attendants. Hot meals as well as backup C-rations were provided to exercise participants. After their arrival, the 22nd Air Force established operations to support the supply and transportation requirements. Miscellaneous expendable supply requests were transferred through exercise players and supply representatives. On-site assets were reviewed and shortages were requested from Nellis AFB and the 22nd AF. Hot line equipment provided by the U.S. Army NAICO was transferred to USAF control after change of command between the two Services. POL services were provided by the Harvest Eagle Red Horse team. The OSC requested and promptly received additional vehicles (five 4-wheel-drive jeeps and two 2-1/2-ton trucks) after reassessment of his resources.

(c) Specially equipped aircraft from the emergency response assets of the the DOE Nevada Operations Office (NVOO) were utilized in conducting aerial radiation monitoring and photo surveys.

(d) The Air Transportable RADIAC Package (ATRAP) and Precision Measurement Equipment Laboratory (PMEL) technicians from Kelly AFB, TX, were utilized to provide on-site calibration and repair of alpha counters. High wind, blowing sand, and terrain characteristics generated considerable repair of Mylar probe faces to prevent light leaks on alpha counters. The ATRAP also provided an additional 15 PAC-1-S RADIAC sets, two AN/PDR-27s, two AN/PDR-43s, and one tritium alarm set to augment those instruments in operation at the accident site.

(e) The Nellis AFB Civil Engineering decontamination team responded with the M-12-A1 decontamination apparatus to provide an on-site decontamination capability. Due to the limitation of a 500-gallon tank, capacity was increased by connecting hoses between the M-12-A1 and Fire Department water tankers. The on-site transportation officer established a motor pool dispatch service to better coordinate requirements for and use of assigned vehicle resources. A vehicle maintenance specialist from Dyess AFB, TX, was tasked to support and correct minor vehicle repair problems. Tow-vehicle support was provided by DOE and USAF resources to extract vehicles periodically stuck in the sand.

(2) Problems

(a) Lack of speed control by the Nellis AFB Disaster Preparedness Response Force Convoy was noted enroute to the accident site. Speeds up to 70 mph were obtained. There were no radio communications by the convoy. An inoperable passenger bus dropped out of the convoy without the knowledge of the OSC.

(b) Nonreadiness of vehicles at the Nellis AFB off-load area caused a 2-hour delay in departure of HQ MAC Disaster Response Force from Nellis AFB to the accident site. Nellis AFB did not include trip kits in the vehicles for the HQ MAC DRF.

(c) DOE personnel were unprepared for living conditions at Harvest Eagle. Some arrived without bedding material because the DOD was expected to furnish logistic support to DOE in the field.

(d) A mobile refrigeration unit for storage of perishables at Harvest Eagle had to be rented from local sources.

(e) Logistics were not included in the transfer of command briefing by OSC.

(f) The ATRAP was unable to provide full support for all RADIAC equipment because they were limited to the calibration of alpha counters. As of D+5, ATRAP processing included nine AN/PDR-27s, 140 PAC-1-Ss, five AN/PDR-56s, and one AN/PDR-60. Present ATRAP II generator is larger than required and an additional vehicle is required to tow the generator. ATRAP II trailers are very restricted, limiting full utilization of team members under field condition repair loads. During operation, the ATRAP was down to one PAC-1-S. All other instruments were on loan to response teams. Mylar face plates were being manufactured because insufficient face plates were on hand. ATRAP technicians were not fully qualified to repair other agencies' equipment. Their formal training is limited to USAF instruments, PAC-1-S, AN/PDR-43, and AN/PDR-27 RADIAC instruments.

(g) The U.S. Army alpha team did not possess the capability to recharge or replace batteries on Staplex air samplers.

(h) GSA service cards were not available for use in commercial refueling stations by off-site travelers.

(i) DRF members were not properly equipped for desert operations (unavailability of goggles and protective head covering).

(j) Replacement parts (inlet valves) for the M-17 series protective masks were not available, resulting in an additional requisition of 150 masks.

(k) Field kitchen procedures were occasionally inadequate for the high temperatures and blowing sand encountered during food preparation and eating periods.

(3) Recommendations

(a) Convoy discipline should be briefed prior to departure and maintained throughout transit to accident site or destination.

(b) Installations providing transportation support to responding Service teams must insure appropriate actions are completed and required vehicles are immediately available upon arrival of the Service teams. Each vehicle assigned to arriving response teams should contain a trip ticket package that includes a local area and driving requirements. GSA service cards should be readily available for purchase of fuel at off-installation locations.

(c) All response forces (DOE/DOD) must be informed of the living conditions and bring appropriate gear.

(d) Vehicle and power required to make ATRAP self-propelled should be reviewed, along with radiac instrument requirements.

(e) Teams utilizing battery power for Staplex air samplers must be able to recharge batteries in the field or possess sufficient replacement assets. Response team equipment kits should contain an adequate supply of spare parts for protective masks. Logistic support for large quantities of protective clothing and other equipment for use in contaminated areas should be reviewed.

d. Communications and Reporting Systems.

(1) Systems Installed (Army)

(a) Record

1 Radio Teletype (RATT) rig provided secure record via HF radio to Ft. Ord. Ft. Ord introduced traffic into AUTODIN. Activated D-day.

2 Voice On-Site: Switchboard (SB-22) in communications tent with field phones at OPS, EOD, Security, SJA, PAO, hot line, OSC tent, and briefing tent. FM radio nets for Command, EOD, and Security augmented the wire. Activated D-day.

3 Radio: HF/SSB radio to Ft. Ord MARS with PSF as backup. Ft. Ord provided phone patch to AUTOVON. Activated on D-day (early).

(b) Observations

1 The HF radio MARS circuit to Ft. Ord provided numerous phone patches. Quality was not always acceptable.

2 A field wire line was not run from the switchboard, located near CP, to Harvest Eagle due to insufficient field wire. This made communications between the two sites difficult.

3 Messages sent over RATT rig used tactical teletype procedures. At Ft. Ord they had to be couriered across post to the comm center and reformatted for transmission via AUTODIN. This created delays in expeditiously processing high precedence traffic.

4 Comm center operators did not have CNWDI clearances. Highly classified traffic could be encrypted by EOD using a one-time pad prior to transmission. However, these messages would have to be decoded at Ft. Ord EOC prior to delivery to the comm center, adding further delays.

5 On D+2, the CP was moved across the road approximately 300 yards. The tent move started at 1010 local and was completed at 1135. Senior personnel arrived at new CP at 1450 local, but there were no phones in the CP. A JCSE FM radio jeep arrived at 1455 local but had trouble communicating with Harvest Eagle.

6 The Army wire net was deactivated prior to activation of the Air Force net. This deactivation/replacement action was time-consuming, unnecessary, and denied players full-time local telephone service.

(2) Systems Installed (Air Force)

(a) Satellite

1 Two UHF Satellite terminals for alternate voice/record to MacDill AFB, FL. Activated D+1.

2 Voice On-site: SB-22 switchboards at hot line and Harvest Eagle with lines to OSC Qtrs., Log/Comm, Red Horse, PAO, Logistics, DOE tent, Harvest Eagle CP, SP Control, Defense Area gate, AF EOD, hot line, Marine EOD, ATRAP, Navy EOD, Army EOD, Decon/Packaging, and HF radio AUTOVON patch. Activated D+3. VHF and UHF hand-held radios for local/intersite communication preceded and augmented the wire lines. Activated D+1.

3 JACC/CP provided comm center, HF radio to Stockton, CA and Norfolk, VA. Activated D+3.

(b) Observations

1 The UHF satellite terminals provided reliable and high quality voice and record communication. Their mobility and quick activation capabilities are ideally suited for disaster response situations.

2 Proper flatbed trailers for JACC/CP equipment were not available at Indian Springs upon JACC/CP arrival. This unnecessarily delayed JACC/CP arrival on-site over 6 hours. JACC/CP HF radio activation was delayed because of propagation problems with Norfolk, VA, and because an alternate entry station had not been arranged prior to DRF arrival. This forced voice users to compete with teletype for use of the satellite.

3 The wire net was not activated until D+3. Since the Army had deactivated their net the morning of D+2, players were denied telephone communications.

4 Capabilities were not provided for DOE response forces to send data.

5 Although a CEOI had been sent by 22nd AF/CAT on D+1, the telephone routing instructions for contacting the Air Force OSC were not completely coordinated, routing changes were not rapidly disseminated, and all players were not advised on how to call the OSC.

6 Secure voice was available at the CP at Harvest Eagle via satellite and could be patched into the Automatic Secure Voice Communication system (AUTOSEVOCOM) at MacDill AFB.

7 UHF/VHF handitalkie radio communication between the crash site and Harvest Eagle was unreliable.

8 Frequent changes in command and control and in CP locations hindered activation of a system. Sufficient equipment, with the possible exception of field wire, was deployed, but these resources were not coordinated for maximum effect.

9 Communication discipline on radio nets was poor. News media personnel and others with scanner receivers could have readily intercepted and exploited the details of disaster response operations.

(3) Recommendations. The needs and capabilities for interagency and interservice communications should be clarified. Additional staffing may be necessary to coordinate all assets. Private voice communication on-site would alleviate some problems.

e. Security.

(1) Observations

(a) Three security force members arrived on-scene D-day at approximately 1250 hours with the initial EOD element. They were dressed in Anti-C suits and were under the control of the EOD element leader. Their stated purpose was to provide support to the EOD personnel and secure classified components as they were identified. However, these security personnel were subsequently used for other purposes such as helping to remove the bodies of the accident victims, and they were unable to provide dedicated security.

(b) Shortly after they arrived (on-scene) and before an entry control point had been established, two Spanish-speaking males approached the EOD

element. Speaking only in Spanish, they advised the response party that a terrible accident had occurred and that many of their sheep had been killed. The security force called for a Spanish-speaking member of the response team and, after decontamination, the two were debriefed. The procedures and actions taken were satisfactory. All personnel concerned; i.e., OSC, JAG, PAO, were notified.

(c) At 1335, a Nye County deputy sheriff arrived and talked with the OSC and the Security Officer. The deputy asked questions relating to the accident. He was particularly interested about contamination dangers, toxic materials involved, and casualties. The only comments he received were that those answers were unknown at this time. The Security Officer asked the deputy to establish security and traffic controls for the area. The deputy refused, stating that he was alone and that his force was shorthanded. The Security Officer then attempted to hire some off-duty sheriff's personnel but was again told that they were unavailable.

(d) The responding Security Officer was not aware that they could establish a National Defense Area for security purposes once classified materials had been identified at the accident scene. AT 1515 hours on D-day, the control staff decided that the OSC should be advised that establishing a National Defense Area was within his authority. The OSC acknowledged that he was cognizant of that procedure and had in fact established such an area immediately upon his arrival. However, this word was never received by the Security Officer.

(e) A vain attempt was made by the Security Officer to establish a security perimeter around the accident site at 1625 on D-day. However, he had not been provided any RADCON monitoring support and he approached a contaminated area without knowing it. The exercise controllers advised him that he

must remain clear of the northeastern section of the area unless accompanied by monitors. As a result, a complete security perimeter was not established by the response forces until 1410 hours of D+1.

(f) With the arrival of additional response personnel, a problem surfaced with the access requirements into the hot line area. These personnel had not met the DOE requirement for issuance of a badge that gave them CNWDI access. Although the On-Scene Commander could grant access based on his support requirements, it took approximately 2 to 3 hours before this was recognized and the problem resolved.

(g) The security entry control point during the first 2 days of the exercise was the most congested area on the NTS. Personnel controls were virtually nonexistent, traffic was hazardous, and no one assumed any responsibility. At times, it appeared that every player, every vehicle, and every piece of equipment had congregated at the entry point.

(h) At 1430 on D+1, civilian demonstrators arrived demanding that the United States stop transporting nuclear weapons by air. The security forces responded promptly and contained the demonstrators outside the secure area. Their discipline was excellent. At one point, they isolated five to six demonstrators in a tent and held them for 20 minutes against their will. The PAO arrived and, appropriately, concerned himself with the reporters. After 20 minutes, the assistant NAICO advised the Security Officer that he should release the demonstrators because they were at a point where it could be considered detention.

(i) During a security check of the perimeter sentries on D+1, the sentries were observed to be too far apart and poorly briefed. For example, they were told that they should try to dissuade people from entering the area, but if they insisted, they were to be allowed entry. This instruction was prompted by a lack of understanding of the principles of a National Defense Area.

(j) By D+2, the security force had been organized into two flights and a 12-on, 12-off, shift schedule implemented. The shifts worked from noon to midnight in order to split the daylight. However, there were still some equipment problems. Some sentries were posted without communications and some without ammunition. The new flight officer was not knowledgeable of the the fragmentation safety line. Additionally, some sentries began their tour by moving toward an adjacent sentry and visiting rather than maintaining vigilance over their assigned area. This, however, was quickly rectified.

(k) At 1454 of D+2, an off-road vehicle was sighted to the northeast of the area. Two civilians in a dune buggy were quickly apprehended, searched, and detained. The dune buggy was also searched in accordance with good police procedure. Regrettably, the occupants had found and picked up an aircraft part prior to their apprehension and they and their vehicle were contaminated. The results were that two security personnel were also contaminated. Although good police procedures were followed, security personnel must be extremely cautious and always sensitive to radiation contamination when involved in nuclear accident operations.

(l) During the changeover of the entry control point from the initial responding forces to the relief forces, some procedures were altered. This caused some confusion with the entry authority list during the early hours of

the changeover. However, when the new procedures were understood by the participants, confusion was eliminated and good control and expeditious entry were provided.

(m) At 1517 on D+4, two persons were observed on the north side of the site moving toward the secure area. Approximately 2 minutes later a second team of two people was seen on the south side of the secure area. Both teams were kept under observation as blocking forces were moved into position. At 1623, one of the intruders used a hand grenade against the security forces and their leader declared that a hostile act had occurred and moved his forces against them. Both intruder teams were captured and disarmed, however, two sentry force members were killed by the hostile force. The On-Scene Commander was briefed immediately after the first sighting and steps were taken to cover and protect the components. This entire exercise was executed competently and professionally.

(n) On D+5, two persons on horses approached the area from the south. They were intercepted promptly. After a brief interrogation, they were escorted around the accident site and were to be released on the opposite side. Before the north side was reached, the security forces received word to escort the horsemen to the entry control point. Thus, they were given a tour of the perimeter for no apparent reason. Again, as with the dune buggy exercise, the sensitivity to contamination was not considered by the security forces. Although a RAD monitor was called when they reached the entry control point, he performed a very superficial examination. One player and some rock samples that were contaminated went undetected.

(2) Recommendations

(a) The National Defense Area concept must become a common term with all Services.

(b) Radiation control monitors must be more accessible to the security force so that the appropriate support is provided in a timely manner. Security personnel must always be sensitive to the possibility of contamination in all activities and, particularly, to the possibility of contamination far beyond the fragmentation range.

(c) The access requirements for expeditious entry in-cordon must be a key point.

(d) The personnel entry control point should not be located in the immediate vicinity of a roadway or parking lot. The congestion and safety factor is unacceptable.

f. Scientific. Substantial scientific and technical support was made available to the OSC, both on-scene and in the resources at home stations and laboratories. The principal problem, particularly in the early stages, lies in the understanding of the magnitude and extent of those resources and in the OSC staffing and delegation of responsibility to allow maximum utilization of the combined DOD/DOE assets. Basic doctrine and guidance exists, but additional joint training of response elements will be necessary for effective application.

g. Legal.

(1) Observations. The Army player staff perceived the role of the SJA as being limited almost exclusively to the claims function. Grade structure of the support elements of the Army NAIC team was too low. Specifically, the MP and SJA were junior officers who, by virtue of their relative inexperience, were unable to cope with the difficult jurisdictional issues involving control of the accident site, military authority, and the relationships with local and state entities. Additionally, the U.S. Army regulation on security of

accident sites could be more specific regarding the authority of the OSC. The Air Force response team was better equipped to deal with the legal implications of a major nuclear incident. Specifically, two JA officers, an 0-6, and an 0-4, were included on the staff. More importantly, however, they viewed their role principally as advisers to the OSC, SP, PAO, and other staff agencies. This view was shared by the OSC and his staff. As a consequence of this common perception, the Air Force team brought with them reference materials helpful in the resolution of issues presented in the scenario. These materials included relevant extracts of TJAG opinions, DOD Instructions, and appropriate AF regulations.

c. Recommendations

a. The legal staff of Army NAIC, Air Force DRF, and other Service teams should be sufficiently senior to insure an adequate level of experience in dealing with unfamiliar problems both within and out of the military.

b. Service regulations should be examined to insure commonality in both scope and terminology, at least for those instances when more than one Service will be responding. Further, DOD instructions should be examined to insure consistency therewith.

c. Contingency planning must center on the role of the JA as an adviser to the OSC and staff. Claims impact should, of course, be considered, but such problems certainly must not be perceived as the main function of the on-scene JA.

d. JA staffing for the NAIC DRF team should be reviewed. All too often [illegible] are required at differing locations at the same time. [illegible] on-scene JA to be able to exchange ideas on how [illegible] regarding issues of jurisdiction, temporary restraining [illegible] detention of civilians, etc.

h. Public Affairs.

(1) Observations

(a) The public affairs episodes provided realistic play for out-cordon players. The point was made, time and again, that out-cordon exigencies have equal weight with in-cordon activities and that immediate, informed action is required by the on-scene Public Affairs Officer (PAO). Generally, the player PAO was not properly manned, educated, or supported by regulation or procedure to handle the public affairs aspects of a nuclear accident.

(b) The main thrust of the entire disaster response force was aimed at the activities inside the National Defense Area (NDA) and the support of those activities. It took too long to get environmental sampling outside the NDA and to communicate the findings to the public. The need to reassure the public dictates that these be done at once, even if not technically required. The media have already proclaimed a post-Harrisburg "New Nuclear Age," and like it or not, the response team must operate in that environment of public apprehension and media sophistication. There needs to be a combined, coordinated and realistic working plan for reassuring the public. It requires PAO, public health, legal, scientific and security skills and expertise. And it must have equal importance with the hot line problems.

(c) NUWAX play provided examples of mishandled public affairs problems. By denying the presence of nuclear weapons for nearly 30 hours after the accident, the PAO placed himself into a corner with denials, misstatements, contradictions, and erroneous information. In a real situation, we may contain the radiation and not endanger the public in any way, but unless the public is aware of our efforts, successes and problems, the operation will be a failure. It should be emphasized that some expensive things may be

required, not by the accident, but by the requirement to inform the public and to convince them that everything possible is being done to protect them.

(2) Recommendations

(a) PAOs should attend the Senior Officer Nuclear Accident Course (SONAC) - or a similar school - as part of their professional training.

(b) Regulations and policy should be reconsidered and rewritten. The on-scene PAO needs explicit guidance and authority. Fact sheets on radiation contamination, decontamination, and the like would also be worthwhile.

(c) The question of who is going to be the DOD spokesman needs to be addressed continually throughout an accident. Full advantage should be taken of DOE public affairs experience in nuclear accidents.

(d) The PAO response team must be adequately manned and equipped to deal with a large catastrophe, real or perceived.

(e) The PAO needs still and motion picture photo support and needs backup support to process film for immediate release.

i. Contamination Plotting. The ground survey plot of radioactive contamination was incomplete and did not follow guidelines established in either Army FM 3-15 or AFTO 00-110H-12. The plot available at D+6 had not been worked on or reviewed by a health physicist or bioenvironmental engineer and did not include contamination reported by EOD teams. Additional observations and recommendations appear in Section D, para 5.

j. In-Cordon Command and Control. Movement of vehicles and construction equipment within the cordon areas appeared to be lacking any centralized control in either the selection of specific pieces of equipment for specific tasks, or the selection of the priority for use once inside the cordon area. Generally, the vehicles and other equipment would travel by the most direct

route between the hot line and the place at which it was to be used. Ideally, the vehicles and construction equipment should have been restricted to specific routes and pathways within the exercise area. This would have precluded driving over telephone wire scattered about the area, as well as preventing the equipment from driving over areas containing components of the various weapons systems that had been scattered by the "simulated" explosions. While this might have caused some brief delays in the arrival of the equipment at the specific work site, the overall gain in time saved, as measured by the personnel efforts devoted during the D+2 to D+6 period in the search for weapons components, would have been significant.

3. <u>COMMAND AND CONTROL (ON-SCENE)</u>:

a. U.S. Army Element.

(1) Observations

(a) The LTCs serving as team leaders were effective at giving direction down; however, information did not seem to be passed as effectively up to the operations center and command element. The OSC commander briefed that his organization operated on a decentralized concept, and demonstrated team performance confirms this suggestion. It appeared that upon arrival at the operations site, command and control elements became divorced from the operating technical teams and this problem remained evident throughout the Army period of operation. It is generally understood that the OSC devotes much of his time to higher command inquiries and public and private sector concerns, and the NAICO becomes the focal point for operation. This NAICO role was somewhat duplicated by the assignment of a LTC to handle such affairs, and, hence, the NAICO's role upon arrival at the site was diminished. Again, the decentralized aspects of the Army's organization appeared when viewing the independent operations of the EOD element, security element and the alpha team.

(b) The EOD element is designed to operate at the outset in a vital assessment role. Generally operating without direct supervision or support, they are trained to be self-reliant and operate in an independent manner. This keystone to their training causes coordination/communication problems when faced with assimilating their effort into a larger group. In this case, the EOD team and alpha team required close communication and coordination and this was generally not achieved. This problem was further complicated by the lack of a functional centralized coordination point to bring the teams together. This lack of coordination also was reflected in the operations of the security force and the alpha team. Recognizing a need to place guards in "clean" areas, the alpha team made several surveys without the presence of security personnel. After several false starts, the coordinated emplacement of security guards was finally accomplished at the direction of the assistant NCAICO(SPT).

(c) In summary, the lack of a functional and appropriately staffed operations center, away from the activity and confusion at the action site, caused many essential items of information to be analyzed and acted upon only by single teams on-site instead of being examined and reviewed at a centralized location.

(2) Recommendations

(a) The NAIC teams are not prepared to use nor do they understand the roles and capabilities of DOE technical resources. INWS should reinforce training aspects of team coordination and communication process.

(b) INWS could also provide on-call mobile training team support to installations to review, assess and provide consulting services to NAIC commanders. This effort could be accomplished in conjunction with required NAIC quarterly exercises.

(c) The establishment of NAIC response teams in accordance with AR 50-5 results in fielded organizations that are lacking in the appropriate level of knowledge, vulnerable to high personnel turnover, difficult to team-train, and difficult to equip and maintain. The Department of the Army (DA) should review the costs and benefits of establishing a super team.

b. U.S. Army to U.S. Air Force Transition.

(1) Observations. During the approximately 5 hours prior to the official transfer of OSC duties, the Army OSC provided the Air Force OSC with a familiarization tour of all out-cordon site facilities. The Army OSC also made key members of his staff available to provide the AF OSC a quick overview of major actions accomplished, scheduled activities and significant problem areas. After arrival of the HQ MAC DRF, each staff element of the Army and Air Force reviewed their individual areas of responsibility and developed a course of action that would facilitate a smooth transition of responsibility from the Army to the Air Force. The official change-over briefing was a detailed discussion of the current status of the recovery operations. The Air Force was encouraged to ask for any additional information that they felt would be essential to their assuming responsibilities. There were two major problems in the transition phase which hindered on-going recovery operations.

(a) The first problem pertained to the specialized DOE teams and equipment which were on-site to assist the Services in recovery operations. Although briefed on ARG team capabilities by the team chief, it was not fully explained to the new OSC how these teams could be integrated into the Service capabilities.

(b) The second problem was associated with the release of Army (NAIC) and Air Force (Nellis AFB DRF) assets after the transfer of OSC responsibilities. During the official transfer briefing, the Army OSC stated that all

resources (manpower/equipment) currently involved in the recovery operation would be made available to the Air Force OSC for as long as he felt they would be needed. Portions of the Nellis AFB DRF and major units of the Army NAIC were released within a relatively short period of time after the transfer of responsibility. More time should have been taken by the MAC DRF to assess and analyze the full magnitude of the recovery operation prior to the release of these critical assets. Shortages in the area of transportation, communications, and radiation detection personnel/equipment developed immediately after the release of the initial deployed elements. A major influence on this decision making process was the prescheduling of MAC missions for return of Army elements.

(2) Recommendations

(a) All elements who make the initial deployment to the scene of an accident should be retained at the scene until such time that it becomes obvious that their equipment, manpower, or expertise is no longer required.

(b) The OSC should appoint a senior ranking individual to coordinate the early integration of specialized DOE assets into DOD activities.

c. U.S. Air Force Element.

(1) Observations

(a) The command and control of the Air Force resources deployed to the accident site had several deficiencies during the entire exercise and especially during the early stages (D+1 to D+3). Primarily, these were the lack of adequate on-site communications and the failure to establish an effective command post.

(b) The lack of adequate communications precluded the OSC from receiving or transmitting essential information from and to his key staff in a timely

manner. Some decisions were being made that could have jeopardized recovery operations in a real-world nuclear weapons accident.

(c) The information problems were compounded by the lack of a centrally located command post/operations facility in close proximity to the major recovery operations. Decentralization of command and control kept the OSC and his key staff from being abreast of critical actions happening simultaneously within the cordon, at the support site, and at the Harvest Eagle complex. Each staff element was cognizant of its own activities and attempts were made to keep the OSC informed. However, many of the on-going activities cut across the boundaries of staff elements. These were not appropriately coordinated in many cases.

(d) From D+4 on, the effectiveness of the command and control increased to a noticeable extent. This improvement was the result of resolution, to some degree, of the two problems identified above. By D+4, the Communications Officer, in coordination with the OSC, had installed a system of land lines to key locations throughout the site with the main terminal located adjacent to the hot line operations area. While there was no physical command post facility located there, the OSC conducted his operations from that location unless his presence was required elsewhere. These two actions made the OSC more accessible to his key staff and facilitated the cross flow of critical information from one staff element to another.

(e) The single exception to improvement in command and control was in the area of the hot line and in-cordon operations. Individual team members within the cordon were not briefed on other teams and their missions, even though there were several instances where individual team missions overlapped. Delays and incomplete data hindered the OSC in obtaining a true assessment of the hazards and operations within the cordon.

(2) Recommendations

(a) A specifically designed mobile command post should be developed for deployment to the scene of a major accident.

(b) The OSC should review and clearly delineate staff/functional responsibilities to insure positive command and control of all activities.

d. DOE Element.

(1) Observations

(a) The DOE elements on-scene consisted of personnel and equipment from LASL, LLL, SLA, SLL, Mason & Hanger, EG&G, and DOE/ALO. These elements arrived the evening of D-day. Airlifted and prepositioned equipment (LLL and LASL vehicles and trailers) was called into the exercise on D+1. EG&G helicopter (SANDS) flights for aerial photography and radiation surveys were made on D+1 and D+2. ARAC (Atmospheric Release Advisory Capability) at Livermore was activated on D-day and used several times.

(b) The DOE representative met with the OSC on D+1 and frequently thereafter for the rest of the exercise, explained the support they had available, and proposed as an initial action that DOE technical personnel accompany EOD teams on in-cordon inspections and RSP missions. The offer was accepted by the OSC and was implemented on late D+1.

(c) Specific actions taken by the DOE elements were:

1 Accompanied EOD teams on inspection and search missions of accident site on D+1 and all subsequent days.

2 Accompanied EOD teams on RSP missions for the undetonated B43, B61 and W70 warheads beginning on D+1 and ending on D+5.

3 Accompanied various teams in search of classified components beginning on D+2 and each day thereafter. Specialized LASL search equipment was used most effectively after the exercise was terminated as several pieces had not yet been found.

4 Conducted air, soil and water radiation sampling and measurement missions out-cordon beginning on D+2.

5 Flew EG&G helicopter on D+1 to take color aerial photographs and on D+2 to conduct out-cordon radiation survey. On D+3, an additional low altitude (150 ft.) flight was instrumented for in-cordon radiation survey. On D+2, the on-board instrumentation showed the presence of a separated region of deposited radioactivity across an arroyo from the debris which had not previously been observed.

6 The DOE technical personnel were of considerable value in assessing the damage to the undetonated W70, in helping to conduct full RSP, and in taking diagnostic radiographs using the only radiographic equipment on-site which was brought by LASL in their van. Earlier utilization of DOE personnel would, in all likelihood, have precluded the premature movement of the undetonated W70 by the Army EOD team early on D+1.

7 ARAC was used on D-day to establish probable radiation patterns and on D+4 to predict fallout patterns when the W70 was undergoing RSP.

The above actions (not all-inclusive) were appropriate for the DOE support elements.

(2) Recommendations

(a) Better internal and external communications are needed. Timely and reliable external communications would aid technical evaluation and other scientific support from the DOE laboratories off-site.

(b) Service EOD procedures should make explicit the requirement for early radiographs of all possibly damaged warheads. On NUWAX-79, the W70 was radiographed, but a little late. Early movement of debris and enlargement of the hole in the warhead could have resulted in detonation. A radiograph would have indicated the problem.

(c) Technical activities, particularly in-cordon missions, need better scheduling coordination and documentation between the several groups. A central scheduling, dispatching and recording unit should be established near the scene of activity.

(d) EOD procedures should call for DOE technical support to accompany teams, if and when available.

e. DOD/DOE Interface.

(1) The principal interactions between DOD and DOE elements were:

(a) Military EOD teams interfaced with DOE technical personnel, the DOE ARAC capability and DOE radiographic capability.

(b) Military radiation monitoring teams interfaced with the DOE hot spot capability, the ARAC capability, and the EG&G helicopter radiation measurement capability.

(c) Military health physics and bioenvironmental personnel worked with DOE counterparts in developing the site decontamination plan.

(d) Military provided logistics and communication support for DOE elements.

(2) These interfaces occurred both at the DOD/DOE on-site commander's level and at the level of the working personnel. Capabilities were explained and results transmitted between the groups. Naturally, some confusion existed, but on the whole these interfaces worked in an amicable fashion.

4. <u>EOD (CAPABILITIES/PROCEDURES)</u>:

a. Observations In-Cordon.

(1) Intact B43 - Mid day on D+1, a Navy EOD team completed initial RSP on the intact B43 in the fuselage section, removed the H-gear from the weapon and used contractor equipment to lift the weapon from the wreckage and transport it to the staging area. The weapon was moved before there was a DOE assessment of damage.

(2) Intact W70 - On D-day, the intact W70 was located and heavy lifting equipment was requested. After a considerable delay in acquiring lifting gear and authority to accomplish the lifting procedure, but before the extent of damage was known, the Army EOD team removed the wing and engine from the W70 container at noon on D+1. The EOD team used an abnormal entry procedure to gain access to the warhead and then performed the initial render-safe procedure using the proper publication. At 1620 hours on D+2, the shipping container cover was removed and a damage assessment was made. The shrapnel entry hole in the warhead was enlarged to facilitate this assessment. On D+3, the W70 was radiographed and the entry hole was further enlarged to extend the damage assessment. The Army/DOE team satisfactorily accomplished a final safing procedure under adverse weather conditions and moved the warhead to the staging area. On D+5, additional radiographs were taken to complete the damage assessment and the warhead was prepared for shipment.

(3) Intact B61 - On D+1, a two-man Air Force EOD team from Nellis AFB entered the cordon to determine the condition of the B61. They determined the angle of impact and depth of burial, then departed from the area. On the morning of D+2, a four-man EOD team from Hill AFB performed a quick visual check and started to dig the weapon out. The weapon was 90% uncovered and after unsuccessfully trying to visually check the ready-safe switch window, the team left the area. At no time did this team use monitoring equipment or publications. On the afternoon of D+2, an EOD team used a crane to support the weapon while the H-gear was loosened to allow rotation of the weapon to facilitate observation of the ready-safe switch and removal of the strike enable plug. A damage assessment was made and the weapon was left in the hole at the request of DOE representatives to allow them to study trajectory and

velocity. This information could help reconstruct the accident. On D+4, the weapon was removed from the hole and moved to the staging area.

b. Component Search.

(1) Target Rings - Early on D+1, the first reconnaissance of the tail section area was accomplished. The first target rings were found at this time. By noon on D+5, the majority of the uranium parts were located. The equipment used was adequate, but the procedures for search were judged to be deficient. At no time during the search was a careful and coordinated grid search conducted with attention paid to meter indications - the search was random. The remaining uranium pieces were recovered by the ECS after termination of the exercise.

(2) Exploded W70 - A major component was recovered by the USMC element. However, they did not communicate with the Army EOD to determine possible hazards before removing the component from the tail section.

(3) Nonnuclear Components - Visual surface search for components began early on D+1 and was effectively continued throughout the plan. Navy EOD and a composite Army/DOE team did the majority of the search. All performed well and used, in some cases, white ribbon to mark areas searched.

c. Crater Search.

(1) B43 - After a careful surface search by a Navy/DOE team for classified B43 components, it was deduced that the major component had to be in the crater (location of scattered components allowed determination of which crater was associated with which weapon). The team then used shovels to dig for the component. The task was complicated by the nature of the soil and by the depth of burial. When the item was located, a truck winch was used to remove it from the hole. The item was taken to the staging area.

(2) B61 - On D+3, an Air Force EOD team was successful in locating all but one piece of the B61 major components in the crater. Subsequent search efforts, using a front loader and backhoe, resulted in finding some fragments of the missing part. The team members assumed that the mechanical equipment had broken the part. The heavy equipment was a labor-saving device, but it hindered the search by moving soil faster than two men could search through it.

d. General.

(1) Two-man Rule - After D+1 there were a number of violations of the two-man rule by both DOD and DOE personnel.

(2) Site Preparation - On D+1, a full stick and two partial sticks of Aquagel 270 were found near the tail section of the aircraft. A careful surface search for this material should have been accomplished prior to the start of play.

e. Observations - Out-Cordon.

(1) The Army EOD Command Post operated throughout the exercise; however, the log initially established was inaccurate on several occasions. The crucial initial RSP steps were not correctly recorded and a misinterpretation of an ambiguous report caused a misidentification of the Lance warhead section. The hot line was moved within fragmentation range of the B61 before the HE system was declared safe due to inaccurate weapon status reporting. Differences in policy on radio usage caused some early difficulties but were resolved. Location and level of contamination discovered by EOD were not provided to RADCON or medical personnel.

(2) In several instances, various EOD elements were not aware of significant changes to the EOD situation within cordon. On at least one occasion, a team failed to notify other in-cordon elements of especially hazardous procedures in process. Although an effective system for centralized reporting

was developed late in the exercise, central control and coordination never was developed to the necessary extent.

(3) Several outside elements that could have been useful were not requested or if requested not supported. The use of the DOE/ARG was initially unnecessarily limited but improved rapidly. The use of other Service elements in support of EOD for weapon handling was not pursued vigorously and Air Force accident investigation support to assist in debris segregation did not occur.

(4) Early integration of DOE/ARG into EOD play was not accomplished. The DOD (Army EOD) ignored DOE advice not to perform certain procedures pending radiography results. This disregard could have led to weapon HE detonation in some circumstances.

f. Recommendations.

(1) A centralized communication system with a tape recording capability should be a part of all EOD response teams. A secure radio net of low output with central monitor and scanners is recommended for command and control. Additionally, all reporting working elements should have a listing of all capabilities and equipment in a standard format so that a central resources registry could identify essential equipment and skills rapidly.

(2) A strong central authority must be established early - especially when more than one EOD element is involved. Planning sessions are essential in preparing for the next day's activities, but the dynamics of developments during the day also demand close supervision and coordination. Senior EOD, RADCON, Medical and Security staff officers should be assigned.

(3) Action is required to insure the DOE contingent is fully integrated before any significant weapon actions are instituted. This is especially true in peacetime environments when safety and security can be easily accomplished

and when the consequences of inadequate actions may be magnified by public/press reactions. A review of DOD/DOE agreements and a reduction in the number of DOD teams authorized to proceed beyond electrical (initial) render-safe should be considered for peacetime scenarios.

(4) The inclusion of a complex technical EOD problem in any future exercise, as was accomplished in NUWAX-79, is strongly recommended to generate and evaluate the capabilities of the experts tasked to solve the problem. This allows both DOD and DOE to learn more of each other's resources and instill a sense of confidence in handling the more difficult situations that may be encountered in real accidents.

5. RADIATION CONTROL:

a. Team Capability.

(1) Radiation control (RADCON) and monitoring operations as observed throughout the exercise were judged to be inadequate and did not allow timely and accurate information to be provided to the On-Scene Commander. Occasionally, RADCON teams and elements performed monitor and survey operations in accordance with Service directives and demonstrated positive leadership and control. However, in general, Service standards for RADCON operations were not strictly followed.

(2) The capability of RADCON elements to determine the extent and location of contamination as required in Army FM 3-15, AFM 355-1 and AFTO 00-110-A0-12 is questionable. RADCON operations were repeatedly hampered by instrument malfunctions caused primarily by the user; e.g., placing AN/PDR-56 and -60 probes into vegetation and puncturing the Mylar probe face. Since the USAF ATRAP capability is limited to Air Force RADIAC instruments, only limited support for the other Services could be offered. To solve this problem, excessive patching of the Mylar cover (more than 10%) was accomplished resulting in inaccurate readings.

(3) Reference publications of the Services vary in units used to express levels of contamination. The levels expressed in each are comparable but confusing when numerous people and teams with different backgrounds and knowledge levels are brought together.

(4) The reliability of RADIAC instruments was questioned on several occasions and a problem exists with the comparison and interpretation of readings taken by the various RADIAC instruments used during the exercise; i.e., PAC-1-Ss, AN/PDR-60s and AN/PDR-56s. The disparities could have resulted in unnecessary masking and protective measures for extended periods of time and could also have led to a feeling of mistrust of instruments to the point that commanders and user personnel would not rely on reported data.

b. Procedures.

(1) RADCON procedures within the cordon also reflected a lack of command and control. Numerous teams entered the cordon with the same mission, to survey or resurvey the same areas, while other areas of concern; i.e., crater areas, went unsurveyed.

(2) The radial plot which was initiated on D+1 was never fully completed. It should have been accomplished again on D+4 or D+5 due to extensive movement of debris and operations in the craters in high winds which could have shifted the contamination. Instead, during D+4 and 5, 90% of all RADCON operations were directed to reexamination of previously identified hot spots; i.e., aircraft debris. Radials extending from the B43 location were never actually extended beyond 200 feet. However, the combined radial/grid plot indicated radial arms extended to 700 feet. Also, no contamination levels were plotted for the B43 and B61 detonation craters. The radial/grid plot did not exist until after 1800 hours D+3, and then only indicated hot spots in the immediate

vicinity of the main fuselage of the downed aircraft. It was noted that radiation plotting was limited by on-going EOD operations until 1200, D+3, when the ECS allowed other operations to be simultaneously conducted without explosive danger from the W70 warhead.

(3) Throughout the exercise a lack of communication between units in/out of cordon slowed or stopped information from being passed to the On-Scene Commander. Contamination intensity readings were not passed from the monitor/survey teams to the CP as they were obtained. At least one RADCON team attempted to correct the communication problem by utilizing citizens band radios (Channel 15).

(4) Some RADCON team personnel were not properly dressed. Specifically, taping of the Anti-C gear was not given proper priority. Wind conditions did cause some taping to fail; however, only one team leader saw fit to either indicate concern for his personnel or complain about poor performance by hot line personnel. No comprehensive air sampling plan was developed during the exercise. One Staplex air sampler initially erected by the Army NAIC team ceased to function by the end of D-day due to a dead battery. Occasionally, the instrument was casually examined by RADCON teams as the exercise progressed. The instrument was finally removed (still not operating) at the close of D+4.

(5) The initial monitoring of the areas approaching the site was accomplished by Army personnel in accordance with Army FM 3-15. Procedures were generally followed with the exception that all members of the initial responding team were unnecessarily fully dressed in Anti-C clothing. This led to identification and management problems for all members. The decision to unmask those not entering the crash site was delayed because of misinterpretation

of the chart in Army FM 3-15, para 3-2. During the period before the decision to unmask was made, numerous personnel including Navy EOD, County Sheriff, and local area civilians were not provided masks, Anti-C or other radiation protection.

(6) Monitoring teams did not follow prescribed RADCON survey procedures of AFTO 00-110A-12 or Army FM 3-15, which require marking of designated levels of contamination. The resulting plot of contamination of the accident site did not reflect any correlation of isodose or isocon lines of plotted readings. The radial survey plot on D+3 was not oriented properly and this led to confusion of subsequent teams in using the reference map.

c. Recommendations.

(1) Review mission of ATRAP with possible expansion to include other Services' instruments.

(2) Have a joint review of publications; i.e., Field Manuals, NAVOPS, and AFTO to standardize protection measures, instruments, contamination survey and control procedures and general methods of recovery.

(3) Conduct a scientific review of RADIAC instruments used by the various Services to insure that instruments are reliable, comparable with each other with proper calibration procedures, and adequately designed for all field environments.

6. RECOVERY AND SALVAGE:

a. Nuclear Weapons Components.

(1) Recovery and salvage of nuclear weapons components begins when the EOD teams finish render-safe procedures, disposal procedures (if required), recovery of classified components, and delivery of whole or parts of nuclear weapons to the designated recovery and salvage area. The steps observed during the recovery and salvage of nuclear weapons components were:

- o positive identification and/or verification
- o decontamination and packaging as required to allow removal from the radiation contamination area
- o final packaging for shipment and disposition

(2) An integrated DOE/DOD team was used in the identification and/or verification of components prior to decontamination and packaging. This mix of experience and knowledge lent itself to an effective operation. All components were correctly and quickly identified.

(3) Decontamination and packaging was accomplished mainly by DOD personnel under the supervision of DOE packaging specialists. For components that could be packaged in plastic bags, they were first monitored and if surface contaminated, bagged and remonitored. This process was continued until no external contamination was present. At this point, the component was passed across a separate hot line crossing point inside a tent erected for this purpose. The components were immediately remonitored for lack of contamination. The three whole weapons were decontaminated using proper procedures.

(4) Final packaging for shipment and disposition was also done by an integrated DOE/DOD team. DOE personnel from the DOE final assembly and disassembly plant, PANTEX, closely coordinated the actual packaging for shipment of all components and weapons. Adequate shipping containers were provided by DOE to accomplish the tasks.

b. Aircraft Components. For exercise control reasons, there was no play allowed on-site in either accident investigation or recovery and salvage of aircraft components. However, the draft contamination removal plan did include provisions for this operation.

c. Site Restoration.

(1) The USAF OSC did not develop a recovery plan in accordance with checklist #15 of AFM 355-1. However, in response to an ECS implementer, a joint DOD/DOE effort produced an outline of the NUWAX-79 contamination removal plan. The plan included, in varying degrees of detail, consideration of:

Weapons Removal

Aircraft Removal

Soil and Vegetation Removal

Disposal Location

Hot Line and Processing Area Removal

Environmental Restoration

Certification of Restored Site

Radiological Health Program

Operational Time Table

(2) In view of the compressed exercise time scale, the plan was necessarily sketchy, with greatest attention given (by direction) to the soil and vegetation removal phase. All major items were covered, but some significant points requiring further consideration include:

- clarification of DOD and proposed EPA guidelines for clean-up levels
- use of temporary fixation liquids such as oil rather than water in desert terrain
- treatment of decontamination effluents
- development of long-term (10-20 yr) radiological and ecological follow-up

d. Recommendation.

(1) Basic doctrine, standards, and procedures for site restoration should be reviewed and updated.

SECTION E

LESSONS LEARNED

1. EXERCISE PLANNING & PREPARATION:

a. Scenario Scope.

(1) Lessons Learned:

(a) The scenario for NUWAX-79 was complex and complicated by the multi-service involvement and required a number of artificialities and contraints to be built into the exercise.

(b) The overall planning for NUWAX-79 was extensive and complete; however, certain operational aspects of the exercise relating to execution and control of the exercise were not addressed until rather late in the planning stage.

(2) Recommendations:

(a) That future exercises be structured around a more operationally realistic situation with greater federal, state and local involvement planned.

(b) After the plans for an exercise have been well established, a separate operations group or staff should be identified and assigned the responsibility to plan and control the actual conduct of the exercise. These responsibilities should include the integration of the control center, controller, and umpire activities; the determination of operational communications needs and procedures; and the coordination of exercise control and evaluation plans and procedures.

b. Documentation of Weapons, Material, Logistics Equipment, and Identification of Personnel.

(1) Lesson Learned: Complete, realistic and accurate scenario documentation of weapons, components, and personnel must be available or it can lead to confusion and errors by the players. For example, manifests, packing slips, crew lists, rank insignias, tail number of the aircraft, identification tags, etc. should be provided.

(2) Recommendation: For future exercises, ensure that all required documentation and identification are provided.

c. Joint Task Force.

(1) Lesson Learned: The Exercise Control Staff for NUWAX-79 met only periodically and assembled for the exercise on D-7 and departed within 2-days of exercise completion. This created the necessity of having much greater FCDNA personnel support for the exercise than originally planned.

(2) Recommendation: That subsequent joint nuclear weapons exercise planning staffs evaluate the desirability of a joint task force consisting of fewer personnel than made up the ECS and ECG for NUWAX-79. Further, that based on the planning, execution, and documentation requirements of the exercise, determine a definite period, e.g., D-30 to D+20, that the task force would remain organized.

d. DOE Role.

(1) Lesson Learned: During NUWAX-79 planning, the requirements for DOE support for DOD and the exercise escalated substantially beyond that which was initially anticipated. In that context, the DOE role and organization within the framework of the Exercise Control Staff was not adequately defined to facilitate optimum support of the exercise.

(2) Recommendation: For future exercises, define a formal DOE organization within the structure of the overall Exercise Control Staff so as to provide more effective and coordinated DOE support.

e. Organization and Roles of Controllers and Umpires Should be Reviewed.

(1) Lesson Learned: Although the organization of controllers and umpires worked reasonably well, it required more personnel than necessary, required a dual communications capability, and the respective roles can be confusing.

(2) Recommendation: Consider various options for exercise control organization including combining controllers and umpires, utilizing more distinctive means of identification, and elimination of dual communications channels.

f. Hours of Exercise Play.

(1) Lesson Learned: Hours of exercise play were generally predetermined to be 0800 to 1800. These hours were established because of a number of planning and budgetary considerations. In actual practice, however, these hours were found to be incompatible with the players' requirements and activities and, to some extent, inhibited free exercise play. These hours were adjusted during the exercise to accommodate the players to the extent possible.

(2) Recommendation: For future exercises, consideration should be given to planning for exercise play to permit maximum utilization of daylight hours.

g. Exercise Control Staff Operations and Communications.

(1) Lesson Learned: The location of the ECS operations center 7-miles from the exercise site placed a heavy reliance on radio communication, creating information gaps and confusion at times. Locations of communications equipment within the operations center also created considerable traffic and background noise.

(2) Recommendation: For future exercises, consider location of the operations center in the vicinity of the accident site and primary means of communications should be by wire.

h. VHF Radio Support.

(1) Lesson Learned: Reliance on VHF radios for ECS coordination was excessive. This caused the transmission medium to be congested and resulted in a shortage of portable radio assets.

(2) Recommendation: Less reliance should be placed on portable radios for communications and increased use of the wire facilities.

i. ECS Point-to-Point Communication.

(1) Lesson Learned: The point-to-point communication lines established for the ECS to the On-Scene Commander, Security, and other staff elements were not used extensively.

(2) Recommendation: The point-to-point system should be used more fully. Using point-to-point for more of the field communications requirements would relieve some of the congestion experienced on the two radio nets. Fewer portable radios would also be required to support the exercise or a real emergency.

j. Media Information.

(1) Lesson Learned: Media interest was also extensive in Washington. More information including photos and film should have been available either at ASD(PA), HQDNA, or DOE/NVO.

(2) Recommendation: Information should be released both locally near the exercise site and in Washington to the Pentagon press corps.

k. Press Visits.

(1) Lesson Learned: The national press made NUWAX a 3-day story because they could not visit the exercise site until D+2. An earlier visit could have limited national interest to 1- or 2-days.

(2) Recommendation: Consideration should be given to providing the press access to the exercise site as soon as possible in order to limit the life of the story.

l. Visitor/Observer Program.

(1) Lesson Learned: There is a need to accommodate technical observers and VIPs to ensure knowledgeable people are provided an avenue to observe the conduct of the exercise. However, the program required extensive planning and personnel resources and could interfere with the conduct of the exercise.

(2) Recommendation: Limit the visitors and observers to a more manageable number. The program needs to be put in proper context of desired exercise objectives and must ensure that the visitor/observer program does not distract from exercise play.

m. Critical Nuclear Weapons Design Information (CNWDI) clearances.

(1) Lesson Learned: Considerable controversy developed late in the planning cycle concerning whether the Service response elements would arrive on-scene with the necessary CNWDI clearances with which to perform their duties. Preparations were made so that the NUWAX Exercise Director could grant CNWDI clearances at the exercise site, if necessary. As it worked out, Service response element personnel were provided the required CNWDI clearances prior to departing their home station for NUWAX-79.

(2) Recommendation: If classified DOE components are used in future NUWAX exercises, consideration must be given to player clearance requirements as well as when, where, and by whom these clearances will be provided. Whenever possible, players should arrive already in possession of the required clearances. In any event, the Exercise Director should be prepared to provide back-up support in issuing CNWDI clearances to player personnel at the site.

n. Joint Funding.

(1) Lesson Learned: The original budget estimate of $1,600,000 included both DOE and DOD estimated costs. When initial funds were issued, FCDNA received only funds for DOD expenses and DOE was required to absorb their costs from within existing funds allocated to their agency. The problems of identifying the funding responsibilities in this joint exercise became evident when detailed funding arrangements were being formulated.

(2) Recommendation: The Exercise Plan in any future NUWAX undertakings should consider specific funding responsibilities for each agency or participating Service. The ideal financial arrangement would be for all funds for exercise expenses to be issued to one organization and all costs funded by that organization.

o. Radiological Safety.

(1) Lesson Learned. Ra-223 is a safe contaminant.

(2) Recommendation. Conduct future nuclear weapon accident exercises with Ra-223 or a comparable contaminant.

p. Nuclear Weapons Accident Exercise.

(1) Lesson Learned: All participants in NUWAX-79 believed it was a worthwhile experience and that future exercises should be planned and executed on a regular basis.

(2) Recommendation: That nuclear Weapons Accident Exercises be funded, planned and executed by DOD/DOE on a regular basis.

2. NUCLEAR WEAPON ACCIDENT RESPONSE:

a. Organization

(1) Topic. Command and Control Organizations

(a) Comment/Discussion: The Army response element, a Nuclear Chemical Accident/Incident Control (NCAIC) team organized in accordance with current Service regulations, did not include staffing from assets any higher than those available at the division/installation level. As a result, many of the primary staff positions were filled by officers whose experience in legal, radiological safety, and public affairs matters pertaining to nuclear accidents was quite limited. The 22 Air Force (AF) Disaster Response Force (DRF) was, similarly, constituted from personnel assets available at the base level; however, it was

larger, staffed with more senior personnel, and had the benefit of more than one officer in a number of the key staff positions. It was readily apparent that many of the day to day exercise problems confronting the On-Scene Commanders (OSC) were unrelated to any specific procedure or prior training. As a result, problem resolution was often a product of the broad ranging judgement and experience of the Commander and his staff, rather than documented procedure. In the view of the On-Scene Commanders, the effectiveness with which the two Service teams would have been able to respond to an actual nuclear weapons accident was judged to range from marginal to inadequate. The Service teams, and in particular the Army NCAIC team, that responded were in some aspects too small, too junior, and too inexperienced to, in all fairness, be expected to accomplish the management tasks with which they were faced.

(b) Conclusion: Command and control of a nuclear weapons accident will be especially difficult because of the myriad of complex technical, environmental, and public affairs demands confronting the On-Scene Commander and his staff. Service On-Scene Commanders responding to a real nuclear accident will need staffs comprised of the most senior, experienced personnel available.

(c) Recommendation: That the management of nuclear weapons accident response forces be assigned to commands where senior, experienced staff resources are readily available to support the On-Scene Commander.

(2) Topic. DOD/DOE On-Site Relationships

(a) Comment/Discussion: Prior planning for assimilating the DOE functions into the DOD command structure was generally inadequate. In particular, a DOE work center was never established in the vicinity of the DOD Commander's staff functional location and DOE representation was not initially incorporated

into the On-Scene Commander's staff organization. Although the DOE Accident Response Group (ARG) team chief briefed each of the DOD On-Scene Commanders on ARG capabilities, the proper and most effective employment of these capabilities was neither stressed nor reached the full cognizance of the DOD elements. The result was that the ARG was generally left to work independently, most notably during the initial phases of the exercise. Understandably, the DOE observation was that initial communications between DOE and DOD senior participants and specialists were less than adequate. A good working relationship did eventually develop, but not from the establishment of a DOE focal point on the DOD On-Scene Commander's staff.

(b) Conclusion: The role and functional capabilities of the DOE participants in a joint nuclear accident response force were not clearly perceived. This resulted in the inefficient utilization of the extensive technical capability possessed by the DOE/ARG for a longer-than-expected period after its arrival on-scene. An effective DOD/DOE working relationship took an excessive amount of time to develop under existing doctrinal agreements.

(c) Recommendation: That consideration be given to designating the senior DOE representative as the technical deputy to the On-Scene Commander with the authority/responsibility for weapons-related and technical radiological aspects of the operation. This would be an interim measure pending completion of the doctrinal and procedural reviews recommended elsewhere in this report.

b. Policy

(1) Topic. Doctrine

(a) Comment/Discussion:

1 Current doctrine contains terminology that differs among Services.

In addition, inconsistencies in the actual guidance provided exist among the various Service publications and, in some instances, between Service and joint doctrinal publications. For the On-Scene Commanders, the burden of overcoming the differing terminology and regulatory guidance appeared to impede efficient operations and often resulted in operational confusion. Both On-Scene Commanders perceived a definite need for a common terminology and procedural document applicable to all of the Services and the nuclear weapon accident response elements of the DOE.

2 There is no common guidance or joint "doctrine" relating to the basic considerations and priorities for action upon which an On-Scene Commander can rely to assist him in determining when and how to use the available DOD/DOE resources and for what purpose. The lack of such guidance was a contributing element in creating considerable confusion at the DOD/DOE interface in the field. The interface problem was compounded because, despite the broad joint agreement, both the DOE and the Services tended to respond in accordance with their respective procedures. These procedures were often not fully compatible with one another. The net result was that some significant problems developed with the DOD communications and logistical support provided to the DOE during the joint response effort.

3 There are some uncertainties and questions regarding the appropriate role and responsibilities of Joint Nuclear Accident Coordinating Center (JNACC) and its relationship to accident field forces and higher headquarters (particularly with the DOE/EOC).

(b) Conclusions:

1 Potential commanders of joint DOD/DOE nuclear weapons accident response forces are at a considerable operational disadvantage because of the

inconsistencies in terminology and guidance contained in the various Service and joint Service publications currently available.

2 There is no joint document which provides general guidance or "doctrine" relative to basic considerations and priority actions associated with a major nuclear weapons accident.

3 Clarification is needed with respect to the role of JNACC and its relationship to accident field forces and higher headquarters.

(c) Recommendations:

1 A joint DOD/DOE group should be established to develop a single joint procedures manual which would identify all basic considerations and priority actions associated with a nuclear weapons accident.

2 The "Joint Department of Defense and Energy Research and Development Administration (ERDA) Agreement in Response to Accidents or Incidents Involving Radioactive Materials or Nuclear Weapons" should be reviewed and updated in the context of the NUWAX-79 experience.

3 A complete review should be made of the missions and functions of the DOD/DOE JNACC.

4 Each Service and the DOE should review and modify existing procedures and organizations for response to nuclear weapons accidents in a manner consistent with the updated DOD/ERDA Agreement and the joint DOD/DOE procedures manual as they become available.

5 Information contained in the joint DOD/DOE procedures manual should be included in the appropriate individual Service school and Interservice Nuclear Weapons School (INWS) programs of instruction.

(2) Topic. Public Affairs

(a) Comment/Discussion: The Public Affairs Officer (PAO) assigned to the

initial Army NCAIC response force denied the presence of nuclear weapons for nearly 30 hours after the accident. His current guidance dictated that "Normally the presence of nuclear weapons will neither be confirmed nor denied" with the caveat that "Official confirmation of the presence of such weapons may be made when it will have significant value in connection with public safety or as a means of reducing or preventing widespread public alarm." In his efforts to comply with this guidance, he placed himself in a corner with denials, misstatements, contradictions, and erroneous information. Compounding his difficulties during this 30-hour period was the presence throughout the entire area of personnel dressed in anti-contamination clothing and wearing radiation dosimetry hardware. Both On-Scene Commanders viewed the Public Affairs Officer as very critical to their successful interface with the public. Both felt that this position should receive added scrutiny and emphasis.

(b) <u>Conclusions:</u>

<u>1</u> Current public affairs guidance to the Services concerning nuclear weapons accidents is sometimes confusing. Existing guidance available to the NCAIC Public Affairs Officer is out of step with the times and hard to interpret. It could have resulted in considerable difficulty in maintaining public trust and confidence during a real accident situation.

<u>2</u> The significance of the Public Affairs Staff Officer to the overall success of a nuclear accident response force is probably much greater than we currently appreciate.

(c) <u>Recommendations:</u>

<u>1</u> DOD and Service regulations and directives should be reviewed and revised as necessary to provide for maximum frank disclosure in the field in the event of a nuclear weapons accident.

2 Special review should be made of public affairs staffing and the training and preparation given to personnel who perform this function on Service nuclear accident response forces.

(3) Topic. DOD Authority

(a) Comment/Discussion: The Army NCAIC team experienced a number of problems in exercising DOD authority in jurisdictional and security issues on what was considered, by the exercise scenario, to be private land. Staff members assigned to the initial NCAIC response force did not have a clear understanding for the need to establish a National Defense Area (NDA) in compliance with AR 380-20.

(b) Conclusion: A clear understanding of the DOD On-Scene Commander's authority at the site of a nuclear weapons accident is important in establishing on-site control, especially from the legal and security standpoints. There is a lack of common understanding, among the Services, of the concept and establishment of a National Defense Area or any similar Federal restricted zone.

(c) Recommendation: Service regulations, directives, and training should be reviewed, and revised appropriately, to insure that they reflect the significance of the National Defense Area concept and its proper use in the event of a nuclear weapons accident.

c. Procedures

(1) Topic. Joint Awareness

(a) Comment/Discussion: There were a number of instances wherein one element of the response force was performing a task unaware that some other on-site element had either a higher level of technical responsibility or superior equipment for performing the same task.

1 In at least one instance, an Explosive Ordnance Disposal (EOD) element proceeded to move a safed weapon without giving due consideration to a DOE recommendation to hold movement pending review of warhead radiography.

2 The FIDLER radiation detection equipment proved to be a superior instrument for field use and was in high demand. Nevertheless, a number of FIDLERs in possession of the Occupational and Environmental Health Laboratory (OEHL) were not discovered and put into use until D+5.

3 Decontamination of personnel exiting through the DOD-managed hot line was done in the open. However, there was a DOE decontamination trailer available, complete with shower and hot and cold running water, that went unused.

(b) Conclusion: DOE responsibilities and capabilities are not known to the Services and the individual Service capabilities are often not known to either the other Services or the DOE.

(c) Recommendations:

1 Each Service and the DOE should catalogue its major resources available for nuclear accident response, including qualitative information on capabilities and technical expertise. These catalogues should be consolidated and made available to DOD and DOE elements tasked with responding to nuclear accidents, ideally as part of a joint DOD/DOE procedures manual.

2 An annual high-level seminar of DOD On-Scene Commanders, their representatives, and DOE Accident Response Group representatives may need to be conducted to establish and maintain a working familiarity with the individual and organizational responsibilities and capabilities available.

(2) Topic: Command Post Management

(a) Comment/Discussion: DOD response element commanders were usually physically separated from their staff elements by considerable distances.

Communications between the commander and his staff were often spotty and occasionally impossible except for face-to-face discussions. An effective central point of contact was never established for the management of all Radiological Control (RADCON) matters. As a result, the contamination plot produced on D+6 not only lacked the RADCON data gathered by the EOD teams but it had not been coordinated through the Health Physicist or Bioenvironmental Engineer. The AF response element commander observed that representation from the DRF staff and adequate communications between the user and staff operating locations through a centralized command center would have immeasurably improved command/control. He further recommended that the first item of business during any future exercise or accident response be the establishment of a camp command center with adequate communications to function as a true coordinating agency.

(b) Conclusion: Both on-site control and the maintenance of information regarding current response status were considerably hampered by lack of an effective communications net tied to a central command post. It was apparent that in order for the Commander to effectively manage the response to a major nuclear accident, all information must be received, coordinated, and acted upon at a single integrated command post and it must be done quickly. Additional facilities, equipment, and personnel in addition to what is now in our planning documents will be required to establish and maintain coordinated command and control at the scene of a nuclear weapons accident.

(c) Recommendation: Service and DOE organizational procedures should be revised to provide for the rapid establishment of an effective, central command post at the scene of a nuclear weapons accident.

(5) Topic. Logistics Support

(a) Comment/Discussion: In order to take maximum advantage of the available seven-day exercise window, logistic support of housing and rations was provided through the preexercise establishment of an AF Harvest Eagle Base Camp. Both DOD On-Scene Commanders recognized the unrealistic aspects of this prearranged support facility. Likewise, both viewed the logistic concerns in the establishment of a base camp to be among the most difficult and monumental real world problems that they would initially have to face in responding to a major accident in a remote area. Logistic assets currently planned for deployment with the Service response forces are quite austere compared to the support available from a Harvest Eagle Base Camp.

(b) Conclusion: As a scenario expedient, the critical logistical problems of housing and subsistence went untested during NUWAX-79. Management and control of a nuclear weapons accident for an extended period of time, in a remote area, will require a more sophisticated level of base camp support than can be provided from logistic assets now planned for deployment. Management of an accident response effort would be made considerably more difficult if the On-Scene Commander had to initiate the upgrade of his base camp support facility after his forces had arrived in the field.

(c) Recommendation: An elevated level of logistic base camp support for response to remote areas must be specifically identified, preplanned, and programmed to deploy immediately on order.

(4) Topic. Aerial Photographic Support

(a) Comment/Discussion: Although NUWAX-79 was conducted at the semi-remote DOE Nevada Test Site, the area chosen was one that had been in fairly constant government use for nearly 30 years. Nevertheless, the most recent topographic maps available to the On-Scene Commanders were based on 1959 data.

A number of the man-made features in the topography had changed. This lack of up-to-date maps imposed a severe hardship on the response force effort, especially with respect to rapid and accurate radiation plotting.

(b) Conclusion: The lack of current mapping in remote and semi-remote regions of the United States appears to be a fairly common situation. This shortfall may be a difficult problem to overcome after a nuclear weapons accident has occurred.

(c) Recommendation: Aerial photographic surveys must be preplanned to provide immediate support to the response force commander and his technical advisors as an integral part of standard nuclear accident response procedures.

(5) Topic. Public Concern

(a) Comment/Discussion: The interface between DOD response forces and the civilian populace was intentionally restricted in play and evaluation during this first-of-its-kind accident exercise. Nevertheless, a number of problems became apparent at this interface. One such problem was that several days had elapsed before environmental sampling outside the National Defense Area was initiated and the on-scene Public Affairs Officer informed of the results. The 22 AF After Action Report provided the following views with respect to this topic: "The public perception of the dangers to their health and what is being done to protect their health is just as important a consideration as locating and disarming weapons. A combined team of Public Health, nuclear physics, legal and information experts must aggressively pursue the matter of public health protection and education outside the cordon area. They cannot wait for problems to appear - they must go out with a public health and sampling program before the public asks for one. The public must have the perception that the disaster response team is doing all it can or there will be panic."

(b) Conclusions: There will be a considerable number of additional tasks related to public concern which will present themselves quickly to the On-Scene Commander. Included will be requirements to establish liaison with local officials, conduct health surveys in local air, soil, and water supplies, and initiate programs to satisfy concerns and pressures from local officials before they become a problem. The need for effectively dealing with the public is not only a training problem, but is closely tied with the earlier recommendation that nuclear accident response forces be staffed by the most knowledgeable and experienced personnel available.

(c) Recommendation: Expanded programs of instruction at both Service schools and at the Interservice Nuclear Weapons School should be developed.

d. Communications

(1) Topic. Communications Equipment and Employment

(a) Comment/Discussion: The HF radio/MARS circuit established by the initial response force involved many patches and often provided an unacceptable quality of communication. There was insufficient field wire carried by the initial response force to connect the on-site Command Post (CP) with the Harvest Eagle Base Camp and handi-talkies proved to be an unreliable means of filling the void. The DOE/ARG deployed without an organic communications capability, expecting to use the available DOD equipment. On-Scene Commanders, however, were not prepared for this and did not have sufficient capacity to fully support the DOE requirements. Arrival of the JCS/USREDCOM Joint Airborne Communications Center/Command Post (JACC/CP) communications equipment improved the situation, but even this added asset left the On-Scene Commander with less than the full capability he desired. Collective impressions left by senior Army, AF and DOE players were that communications assets in the field ranged from disappointing to inadequate.

(b) Conclusion: Providing effective, reliable external communications from an accident site in a remote area will require careful planning and the utilization of the best equipment available to the Services today. Because of the sensitive, and sometimes classified, nature of communications incident to a nuclear weapons accident, not only will multiple voice and teletype capabilities be required, but secure links for these will also be necessary. An effective internal communications net is also critical to the command and control of a response effort and should include both wire and radio systems.

(c) Recommendations: Communications plans at the Service response force level should be revised to insure that they provide fully for the support of a jointly constituted accident response force in the field. A complement of mutually compatible equipment with sufficient communications personnel to insure voice, teletype and secure communications for both the On-Scene Commander and the numerous other support elements under his control is also required.

e. Equipment

(1) Topic. Equipment and Supplies

(a) Comment/Discussion: Over 150 individual repairs to RADIAC instruments had to be made in the field, often with the same instrument being repaired more than once. The majority of these repairs were to alpha detection instruments which had suffered punctures of their delicate Mylar windows during routine field use. The Service accident response forces normally deploy with limited changes of anti-contamination clothing. At NUWAX-79, this was dealt with administratively through a contaminated clothing exchange; however, it did lead to the AF On-Scene Commander recommending that the DRF response to a nuclear accident include a minimum of 500 sets of anti-contamination clothing. Replacement parts and components for the M-17 protective masks were quickly exhausted and 150 additional masks had to be

ordered. When replacement Mylar facings for the alpha detection instruments ran out, expedient replacements had to be manufactured in the field. The AF On-Scene Commander observed that current AF RADIAC equipment had once again proved unacceptable in the harsh accident scene environment. He also concluded that numerous commercial brands of respiratory protectors were superior to the M-17 protective mask with which the Service teams were equipped. From an operational standpoint, the AF Commander felt that use of the FIDLER radiation detector, organic to the DOE team and the OEHL but not to the 22 AF/DRF, would have reduced his survey time by 75%.

(b) Conclusion: Equipment, including respiratory protectors and some alpha detection instruments, proved to be, if not inadequate, at least far less effective than the best available. Problems can be expected to develop in the resupply of anti-contamination clothing and the maintenance and repair of protective masks and RADIAC equipment in any exercise or real world nuclear accident situation that lasts for more than just a few days.

(c) Recommendation: A comprehensive review of all equipment organic to nuclear accident response forces should be conducted within both the DOD and the DOE. Included, as a minimum, should be a review of RADCON team equipment and clothing and the supply and maintenance procedures in use by the Services and the DOE to support this equipment and clothing over extended periods of time.

f. Training

(1) Topic. Managerial and Special Staff Training

(a) Comment/Discussion: Neither Service response force came with a staff element trained or prepared to provide overall, integrated and simultaneous management of the RADCON and EOD effort. Initially, each Service EOD team and each Service RADCON team made unilateral decisions regarding

scheduling work and passage through the hot line. This resulted in vehicle, equipment, and personnel congestion at the hot line. Both double coverage and noncoverage of essential tasks in-cordon occurred since few of the teams were aware of their contemporaries' activities. Considerable difficulty was experienced in maintaining a current, overall status of RADCON/EOD activities and progress. Individual RADCON team efforts were adequately conducted, but without an overall staff manager of the joint effort, it was noted that several of the teams began their initial radiation monitoring efforts looking for radiation of different energies. This resulted in initial RADCON data that was not comparable between teams. Initial activity on the part of health physics personnel was almost entirely devoted to insuring the proper collection of nasal swabs. There was no overall health physics manager tasked to insure the incorporation of considerations such as in-cordon stay times and the health of the hot line workers. Similarly, the relief health physics team did not think in terms of the overall bioenvironmental requirement and needed prompting to take on concerns such as providing potable water and a latrine at the hot line, providing sun shade, and monitoring in-cordon stay times of workers. The AF On-Scene Commander observed that current DRF training was inadequate for effective management of a nuclear accident situation and that the ability of the 22 AF/DRF to combine the operations of all DOD teams into a cohesive joint operation was found wanting.

(b) Conclusions: Training of Service response force staff officers and functional managers is inadequate with regard to fully preparing them to deal with the overall on-scene effort in each of their respective areas of concern. There is insufficient specialized training and exposure for potential Service commanders and staff officers concerning the unique requirement to manage

joint and simultaneous EOD, RADCON monitoring, decontamination, and area radiation survey efforts.

(c) Recommendations:

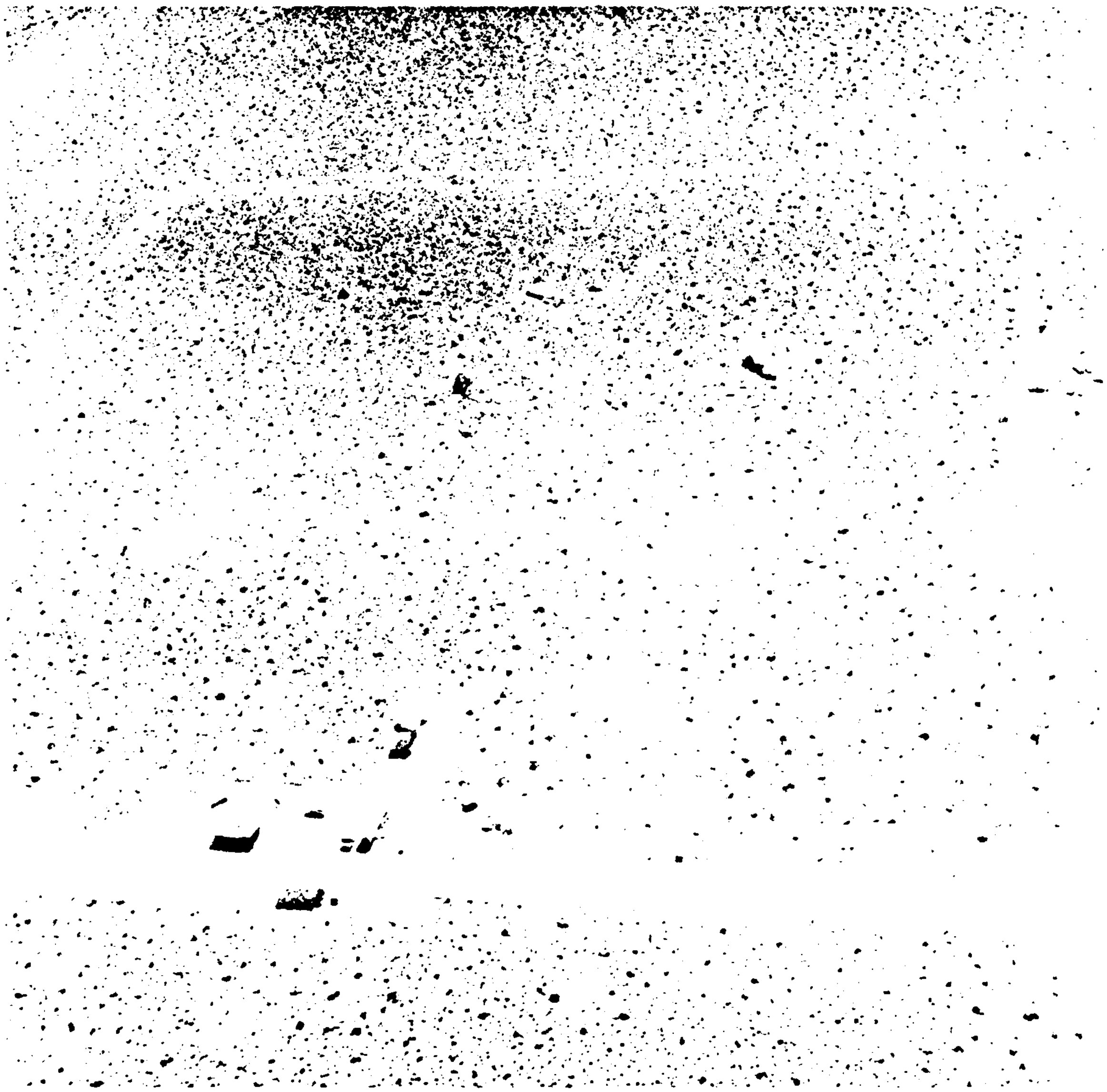
1 Increased emphasis needs to be placed on the attendance of potential Service On-Scene Commanders, and their staffs, at the Interservice Nuclear Weapons School.

2 Service schools and the Interservice Nuclear Weapons School should incorporate doctrinal changes into their programs of instruction as soon as the joint procedures or revised service doctrine become available. Increased emphasis is needed at these schools with regard to the problems facing the On-Scene Commander and his staff in managing an overall, joint response effort.

3 Multi-Service and joint DOD/DOE nuclear accident training must be encouraged and must be conducted to the maximum extent possible.

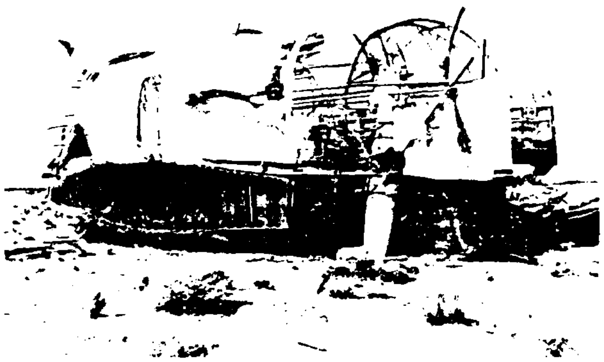
A U.S. Air Force Security Policeman stands guard at the entrance to the Harvest Eagle site.

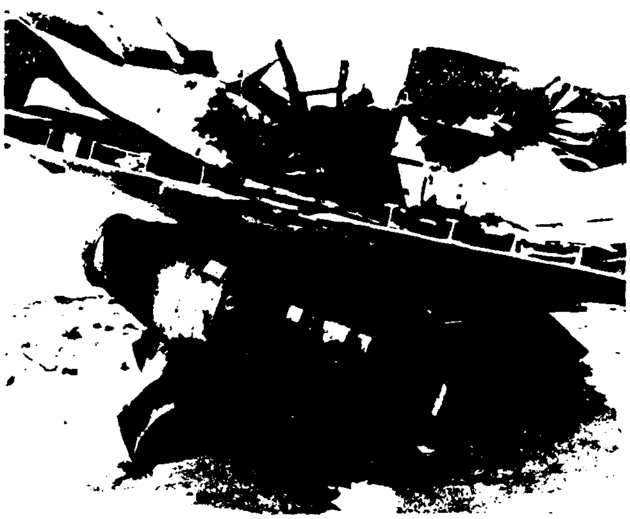
H-Hour, D-Day, 18 April 1979, smoldering aircraft wreckage at the accident site.

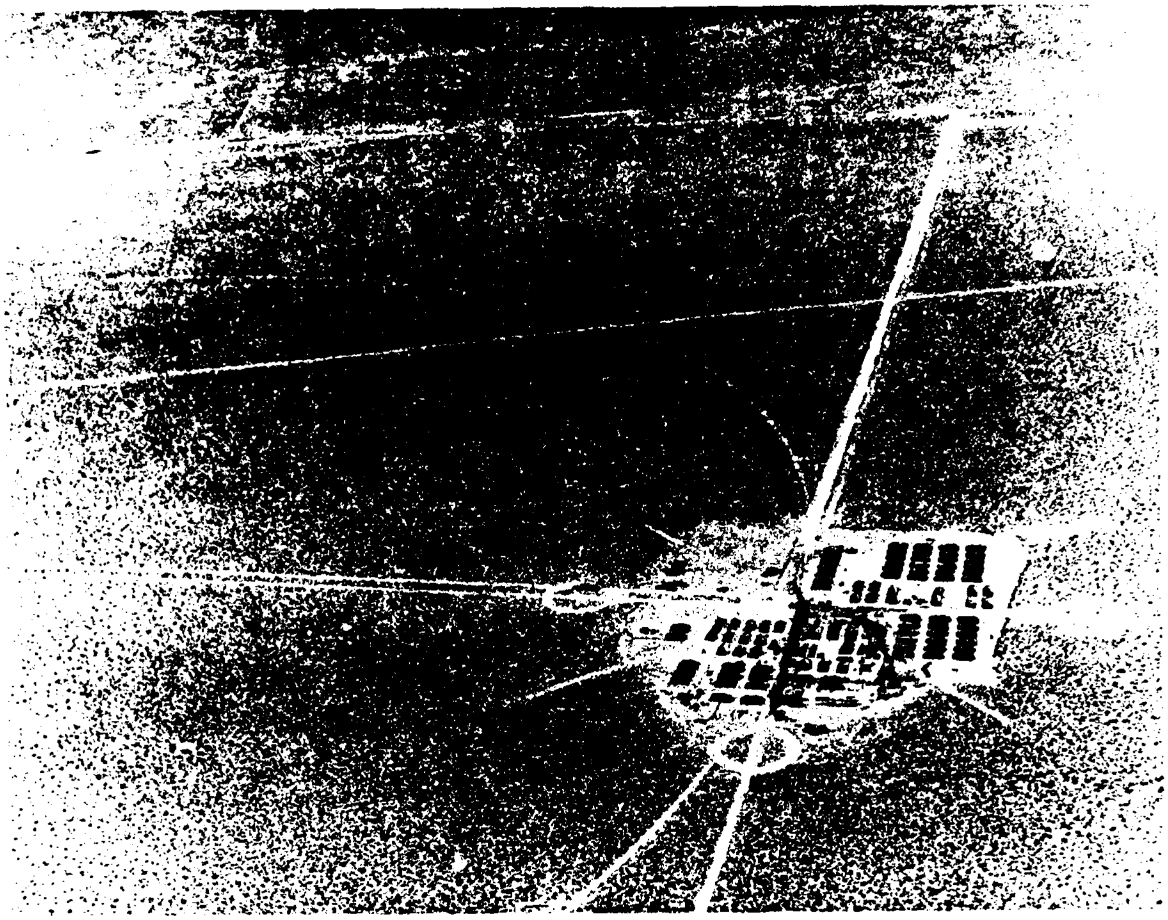


Aerial view of the accident site (looking south).

Emplacement of inert, modified trainers and actual classified weapons components posed realistic technical problems to EOD personnel on the scene. ABOVE LEFT: Aft fuselage section containing a simulated detonated W-70 weapon. The W-70 weapon and nuclear projectile components were spread as far as 150 meters away from the fuselage. CENTER: A B-43 bomb is lodged in the center fuselage section. LOWER LEFT: The W-70 warhead section container under a wing section and engine posed a difficult problem to a weapon with internal damage. BELOW: Partially buried B-61 bomb created access problems and an unknown readiness condition.

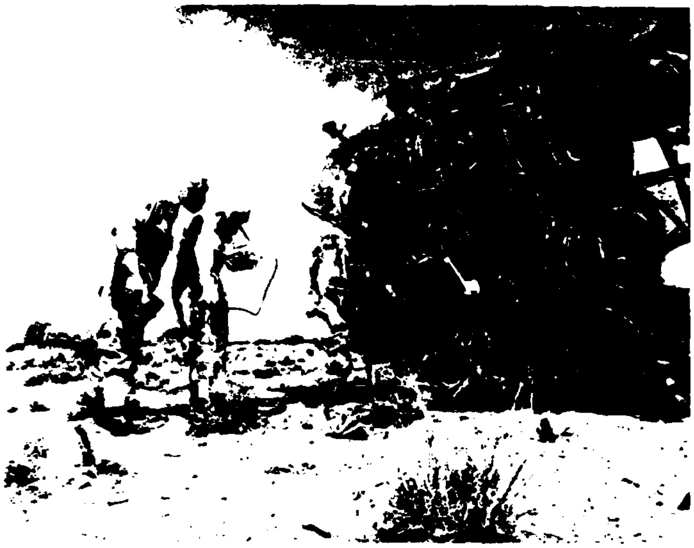






Aerial view of the Harvest Eagle site (lower right) and the accident site (upper left). Road distance between the two areas was approximately two miles.

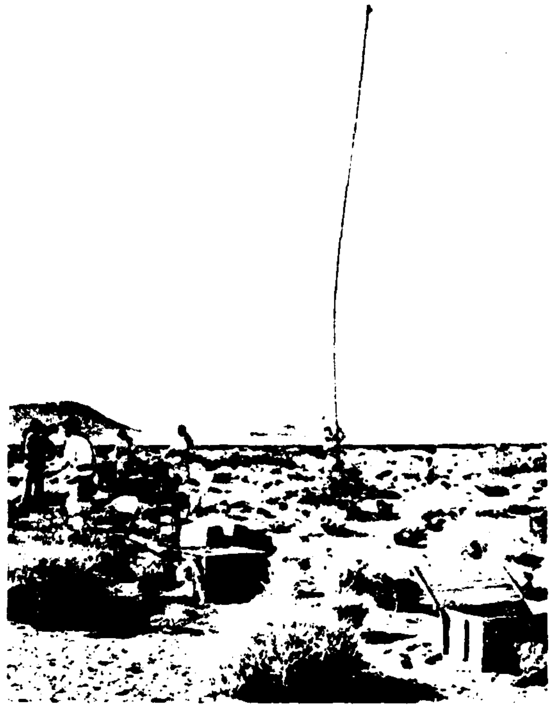
Entry control point for the National Defense Area.



LEFT: Radiological monitoring near the damaged aircraft cockpit.

An EOD team conducts a search in cordon for weapons components.

LEFT: A crater simulating the high explosive detonation of a weapon. The pipe in the center was used to emplace contaminant.



Readiness Command, JACC/CP establishes satellite terminals for long distance communications.

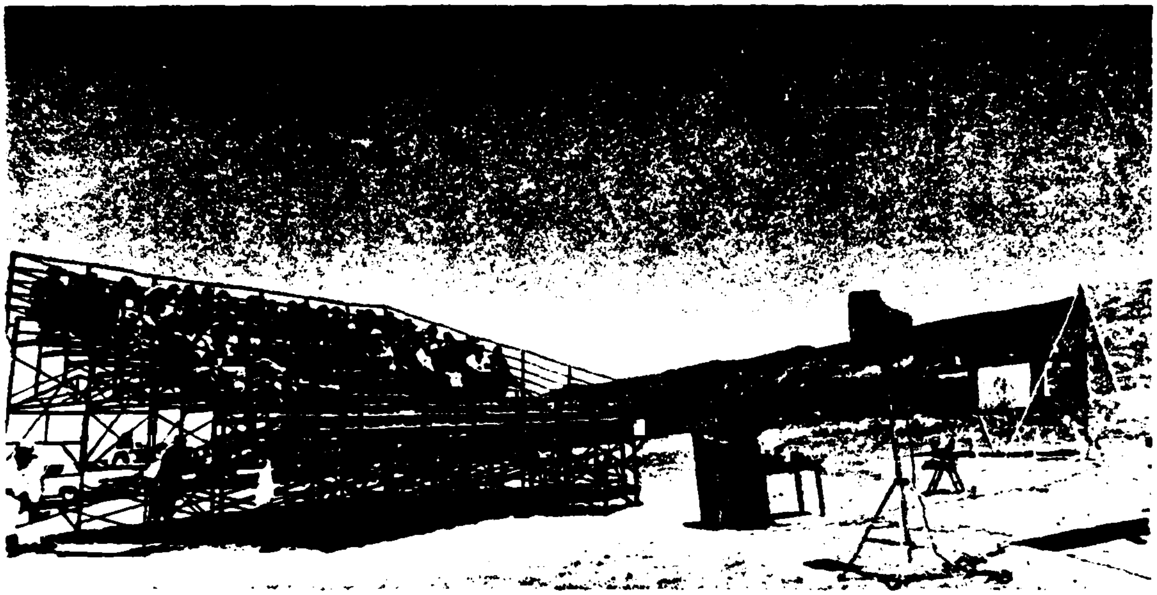
Meterological monitoring.

Army NCAIC team establishing communications.

Lawrence Livermore Laboratory's "Hot Spot" equipment.

Briefing of Dr. Duane Sewell at the Exercise Control Staff Operations Center.

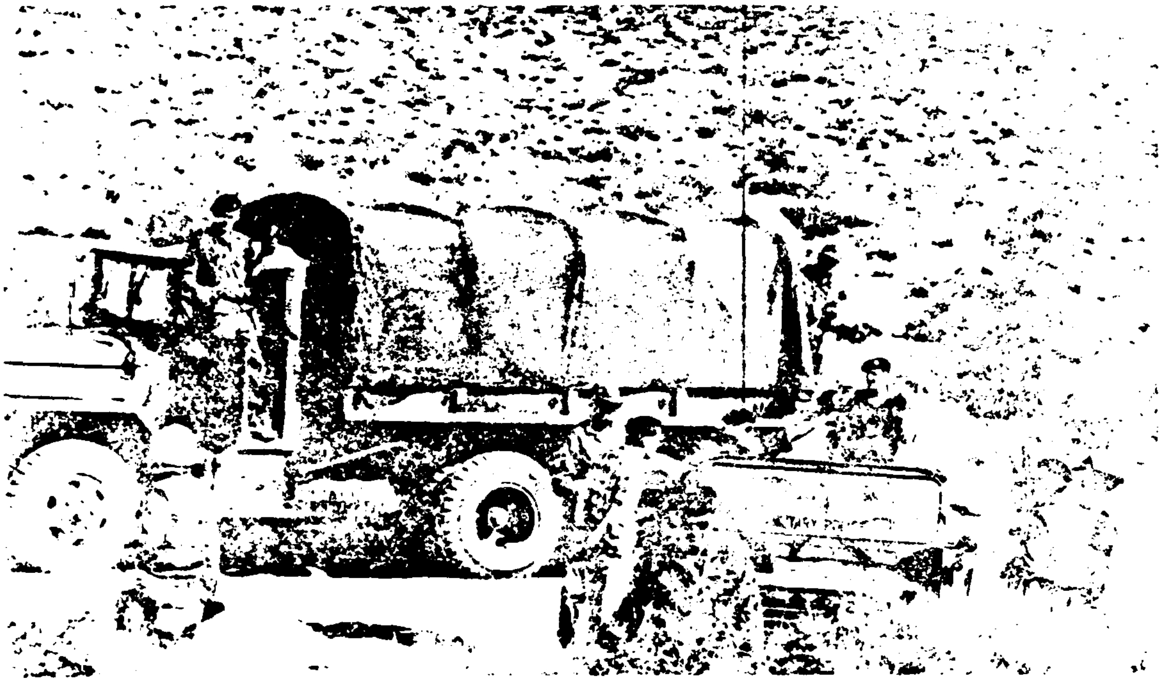
Brig Gen Jim Gardner, USAF, 22AF RF, (R) assumes duties as On-Scene Commander from BG Bill Carlson, USA, Ft. Ord NCAIC team.



MG Tate, Exercise Director, addresses visitors on D+2.

News media coverage of the accident on D+2. Helicopter is conducting aerial radiological survey of the accident site.

Security and Military Policemen quell demonstrations at the accident site.



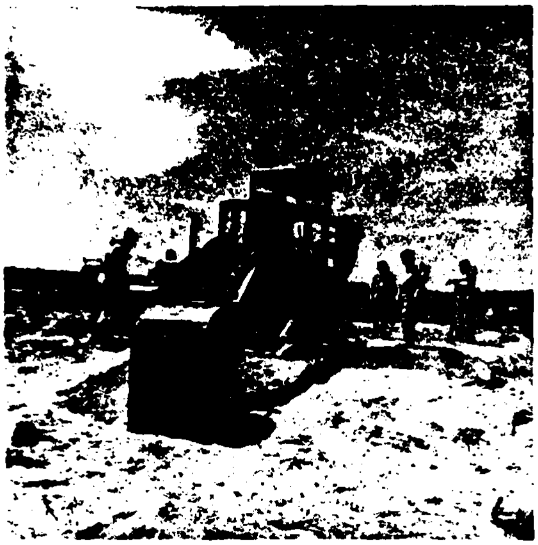
Security police apprehend "sightseers."

Umpires made critical evaluations to all aspects of accident response. (Security Umpire is shown with a Security Police Officer from 22AF).

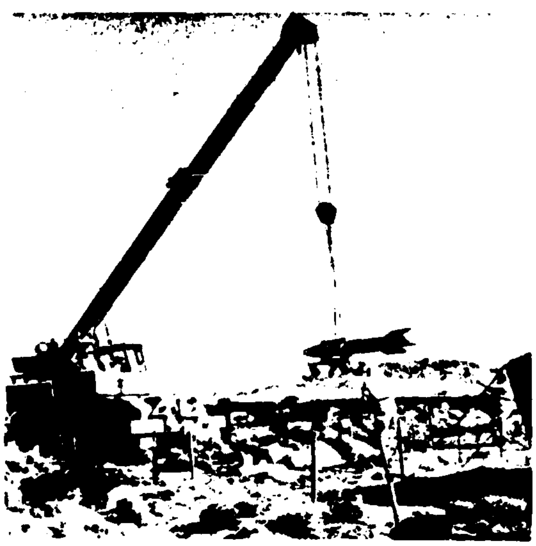
U.S. Marines provided security during pre-exercise and post-exercise operations.

.EFT: A W-70 warhead section is
'illed with inert gas.
ELOW CENTER: Film documentation
of W-70 render safe procedures.

LEFT: EOD Team retrieves weapon components.



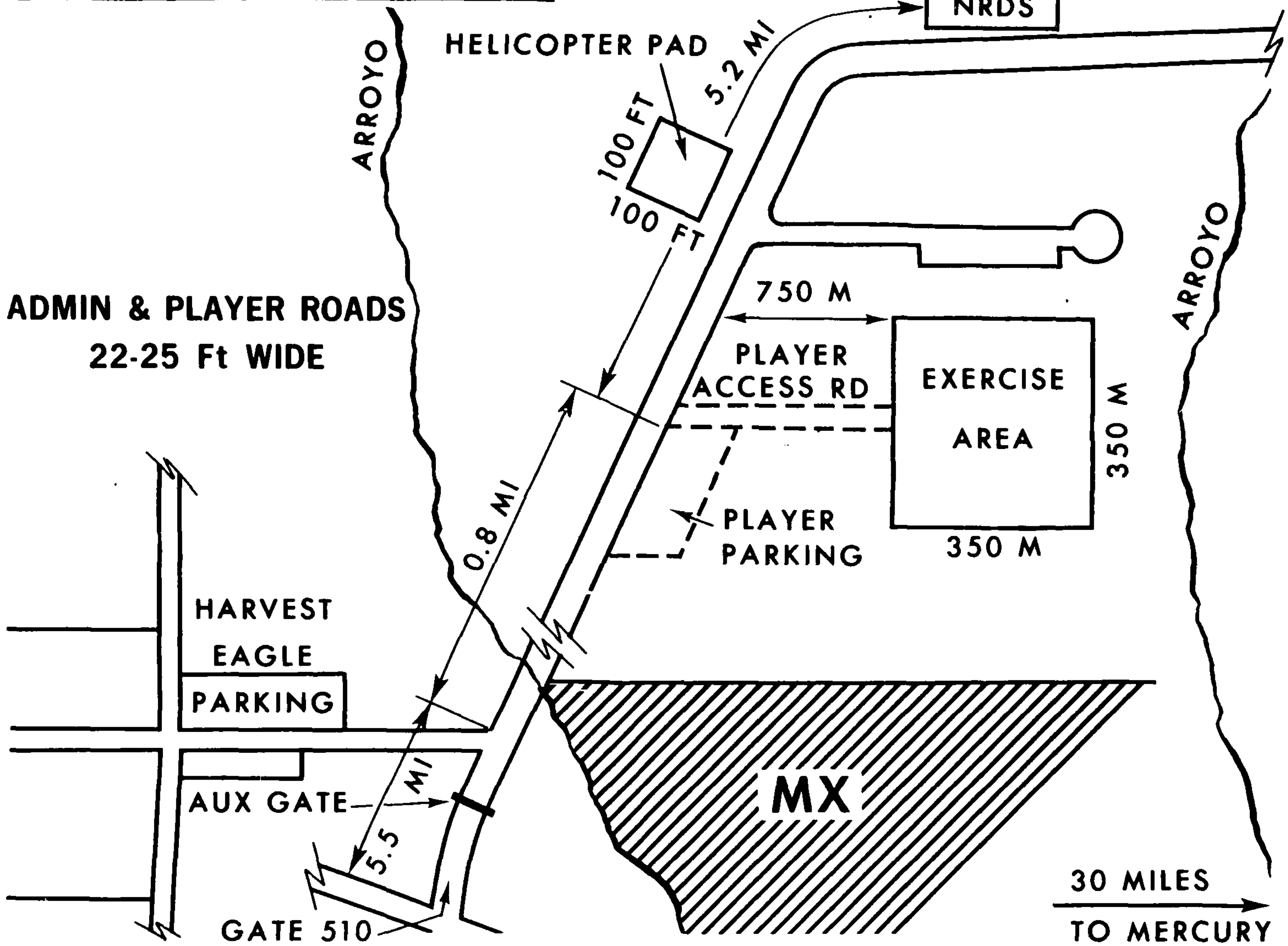
ABOVE LEFT: Excavation of crater during component recovery effort. ABOVE RIGHT: W-70 warhead section container is placed at the hot line. BELOW: Weapons and components are recovered, decontaminated at the hot line and staged for shipment.



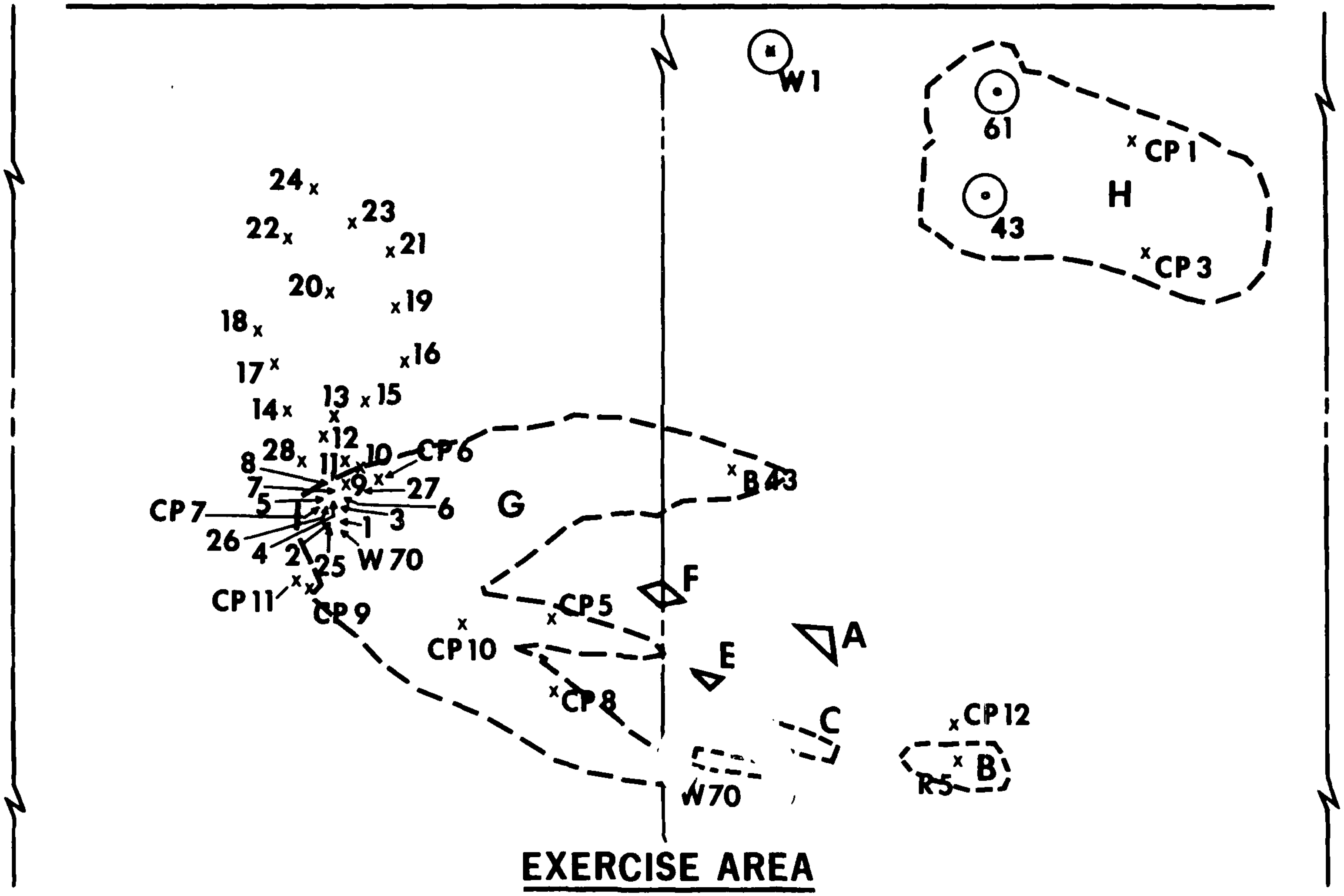
MG Tate addresses participants at the Post-Exercise Critique.

NUWAX 79 LOCATION MAP

ADMIN & PLAYER ROADS
22-25 Ft WIDE



CONTAMINATION PLOT AND WEAPONS COMPONENTRS LOCATION



SECTION G

GLOSSARY

A&E Building	Administration and Engineering Building
AC	Alternating Current
AFIF	Air Force Industrial Fund
AFLC	Air Force Logistics Command
AFSC	Air Force Systems Command
AGL	Above Ground Level
ALCE	Airlift Control Element
ALT	Alteration
ARAC	Atmospheric Release Advisory Capability
ARF	Accident Response Force
ARG	Accident Response Group
ARMS	Airborne Radiological Measuring System
ASCC/WP 94	Air Standard Coordination Committee, Working Party 94
ASD(PA)	Assistant Secretary of Defense (Public Affairs)
ATC	Air Training Command
ATRAP	Air Transportable Radiac Package
ATSD(AE)	Assistant to the Secretary of Defense for Atomic Energy
AUTODIN	Automatic Digital Network
AUTOSEVOCOM	Automatic Secure Voice Communications
AUTOVON	Automatic Voice Network
B43	Nuclear Weapon (Bomb)
B61	Nuclear Weapon (Bomb)
BG	Brigadier General
CAP	Concept and Analysis Plan
CAT	Crisis Action Team

C-E	Communications - Electronics	1
CEOI	Communications - Electronics Operating Instructions	2
CES	Civil Engineering Squadron	3
CESO	Communications - Electronics Staff Officer	4
CFRD	Confidential Formerly Restricted Data	5
CNWDI	Critical Nuclear Weapons Design Information	6
COMSEC	Communications Security	7
COSIN	Control Staff Instruction	8
CP	Command Post	9
CPM	Counts Per Minute	10
CRD	Confidential Restricted Data	11
CS	Communication Squadron	12
DA	Department of the Army	13
DC	Direct Current	14
DCS	Defense Communications System	15
DMA	Director of Military Applications	16
DNA	Defense Nuclear Agency	17
DNAGC	Defense Nuclear Agency General Counsel	18
DOD	Department of Defense	19
DOE	Department of Energy	20
DOE/ALO	Department of Energy/Albuquerque Operations	21
DOE/ACT	Department of Energy/Emergency Action and Coordination Team	22 23
DOE/MA	Department of Energy/Military Applications	24
DOE/NVO	Department of Energy/Nevada Operations	25
DOSC	Deputy On-Scene Commander	26
DPST	Disaster Preparedness Support Team	27

DRF	Disaster Response Force	1
EACT	Emergency Action and Coordination Team (DOE)	2
ECG	Exercise Control Group	3
ECP	Exercise Control Point	4
ECS	Exercise Control Staff	5
EIA	Environmental Impact Assessment	6
EIS	Environmental Impact Statement	7
EOC	Emergency Operations Center	8
EOD	Explosive Ordnance Disposal	9
EODGRUONE	EOD Group One	10
EODGRUTWO	EOD Group Two	11
ERDA	Energy Research and Development Administration	12
ESG	Exercise Support Group	13
ETA	Estimated Time of Arrival	14
ETD	Estimated Time of Departure	15
EXPLAN	Exercise Plan	16
FAA	Federal Aviation Administration	17
FCDNA	Field Command, Defense Nuclear Agency	18
FORSCOM	Forces Command	19
FPA	Federal Preparedness Agency	20
FRPPNE	Federal Response Plan for Peacetime Nuclear Emergencies	21 22
FTS	Federal Telecommunications System	23
HE	High Explosive	24
HEOC	Headquarters Emergency Operations Center	25
HF	High Frequency	26
HL	Hot Line	27

IARG	Initial Action Response Group	1
IAW	In accordance with	2
IMPLEMENTER	An action or event that requires a response from or will influence the activities of participating commands/agencies	3 4 5
INWS	Interservice Nuclear Weapons School	6
IO	Information Officer	7
IRAP	Interagency Radiological Assistance Plan	8
IRC	Inspection Record Card	9
JA	Judge Advocate	10
JACC/CP	Joint Airborne Communications Center/Command Post	11
JAG	Judge Advocate General	12
JCS	Joint Chiefs of Staff	13
JCSE	Joint Communications Support Element	14
JEM	JCS Exercise Manual	15
JNACC	Joint Nuclear Accident Coordinating Center	16
JRS	Joint Reporting System	17
KAFB	Kirtland Air Force Base	18
LASL	Los Alamos Scientific Laboratory	19
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MA	Military Applications	21
MAC	Military Airlift Command	22
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MC	Manual Chapter	24
M. C.	Major Component	25
MCAS	Marine Corps Air Station	26
MEDEVAC	Medical Evacuation	27
MG	Major General	28

MHZ	Mega hertz	1
MIPR	Military Interdepartmental Purchase Request	2
MOGAS	Mobile Gas	3
MP	Military Police	4
MPC	Maximum Permissible Concentration	5
mr	milliroentgen	6
MSEL	Master Scenario Events List	7
MST	Mountain Standard Time	8
NAF	Numbered Air Force	9
NAIC	Nuclear Accident/Incident Control	10
NBC	Nuclear/Biological/Chemical	11
NCAIC	Nuclear Chemical Accident/Incident Control	12
NCAICO	Nuclear Chemical Accident/Incident Control Officer	13
NCO	Non-Commissioned Officer	14
NDA	National Defense Area	15
NEST	Nuclear Emergency Search Team	16
NMCC	National Military Command Center	17
NOTAM	Notice to Airman	18
NRC	Nuclear Regulatory Commission	19
NRDS	Nuclear Rocket Development Station	20
NTPR	Nuclear Testing Program Review	21
NTS	Nevada Test Site	22
NUWAX	Nuclear Weapons Accident Exercise	23
NVO	(DOE) Nevada Operations	24
O&M	Operation and Maintenance	25
OPR	Office of Primary Responsibility	26

OPREP	Operational Report	1
OPS	Operations	2
OSC	On-Scene Commander	3
OSD	Office of the Secretary of Defense	4
OSHA	Occupational Safety and Health Act	5
OSI	Office of Special Investigation	6
PA	Public Affairs	7
PABX	Private Automatic Branch Exchange	8
PAO	Public Affairs Officer	9
PMEL	Precision Measurement Equipment Laboratory	10
POC	point of contact	11
POL	Petroleum-Oil-Lubricants	12
POM	Program Objective Management	13
ppm	parts per million	14
PST	Pacific Standard Time	15
Pu	Plutonium	16
RADCON	Radiological Control	17
RADMON	Radiation Monitoring	18
RADSAFE	Radiological Safety	19
RAMT	Radiological Assistance Medical Team	20
RATT	Radio Teletype	21
REDCOM	Readiness Command	22
REECO	Reynolds Electrical and Engineering Company (DOE contractor)	23 24
ROA	Record of Assembly	25
RSO	Radiological Safety Officer	26
RSP	Render Safe Procedures	27

RSWG	Radiation Safety Working Group	1
SAAM	Special Assignment Airlift Missions	2
SANDS	Surveillance and Nuclear Detection System	3
SECDEF	Secretary of Defense	4
SEV	Stockpile Emergency Verification	5
SITREP	Situation Report	6
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SNM	Special Nuclear Material	10
SONAC	Senior Officer Nuclear Accident Course	11
SRD	Secret Restricted Data	12
SSB	single sideband	13
TAC	Tactical Air Command	14
TCC	Telecommunications Center	15
TDY	Temporary Duty	16
TF	Task Force	17
TJAG	The Judge Advocate General	18
TP	Technical Publication	19
TRO	Temporary Restraining Order	20
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TSWG	Technical Scenario Working Group	22
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USA	United States Army	27

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W70	Nuclear Weapon (Warhead)	5
WATS	Wide Area Telecommunications Service	6
WHS	Warhead Section	7

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